REPORT OF THE STUDY GROUP ON COST OF PRODUCTION & PACKING OF IODISED SALT AND SUBSIDY

JAIPUR, 1984

SALT COMMISSIONER
GOVERNMENT OF INDIA
MINISTRY OF INDUSTRY

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CHAPTER I

INTRODUCTION

1.0 CONSTITUTION OF THE STUDY GROUP :

1.1 The Study Group was constituted under O.M. No. 05015|9|84-Salt, dated, 3-8-1984 of the Ministry of Industry (Department of Industrial Development), Government of India, New Delhi to go into the cost of production and packing of iodised salt and the subsidy required to be given to cover the additional cost involved to the private co-operative sectors for undertaking commercial manufacture of iodised salt (Annexure-I). The issues became relevant in the context of boosting up the production of iodised salt in the country under the National Goitre Control Programme.

1.2 COMPOSITION OF THE STUDY GROUP :

1.2.1 The composition of the Study Group is as under :—

— Shri P. Subramanian. —Chairman
Salt Commissioner,
Jaipur.

—Shri T. K. Kamilla, —Member
Director (Admn.),
Ministry of Health & Family Welfare,
New Delhi.

— Dr. P. C. Sen, —Member
Adviser (Nutrition),
DGHS, New Delhi.

— Representative of the Ministry
of Cheimcals & Fertilisers —Member
(Deptt. of Chemicals),
Government of India,
New Delhi.

— Shri J. D. Chaturvedi, —Member
Joint Adviser (CI),
Planning Commission,
New Delhi.

— Shri D. D. Sharma, —Member
Deputy Secretary,
Ministry of Industry,
(I. F. Wing),
New Delhi.

— Shri K. K. Shukla, —Member
Chairman-cum-Managing Director,
M|s. Hindustan Salts Ltd.,
Jaipur.

— Shri F. F. Shroff, —Member
Chief Sales Executive,
M|s. Tata Chemicals Limited,
Bombay.

— Shri M. M. Sand —Member
M|s. Century Chemicals Limited,
Jamnagar (Gujarat).

— Shri Suresh Khemka, —Member
M|s. Lilanad Trading Co. (Pvt.)
Limited,
Calcutta.

— Shri M. G. Venkatesh Mannar, —Member
Managing Director,
M|s. Mavathi Crystal Salt Co. Ltd.,
Madras.

1.2.2 Subsequently the following additional members were nominated on the Study Group as per O.M. No. 05015|9|84-Salt, dated, 31-8-1984 of the Ministry of Industry :—*(Annexure-II)*

— Smt. Debi Mukherjee, —Member
Asstt. Secretary (PFA),
DGHS, New Delhi.

— Director, —Member
National Institute of Nutrition,
Hyderabad.

— Shri S. Ramamoorthy, —Member
Director (Cost),
Bureau of Industrial Costs and
Prices,
New Delhi.

1.3 TERMS OF REFERENCE :

1.3.1 The Study Group was required to undertake a study of various components of the cost of production of iodised salt conforming to the standards prescribed under the P.F.A. Act, 1954 and the Rules made thereunder and make recommendations in regard to whether, and if so, what amount of subsidy was needed to be given at the stages of production and packing to boost the production of iodised salt to meet, in full, the requirements of the goitre endemic areas, as also regarding modalities of payment of such subsidy. The Study Group was also to consider the mode of packing of iodised salt and make recommendations regarding suitable material and sizes of packing, both at the production and distribution levels.

1.3.2 The Study Group was required to submit its report within a period of two months.

1.4 MEETING OF THE STUDY GROUP :

1.4.1 The Study Group met at Jaipur on the 21st and 22nd September, 1984 under the Chairmanship of the Salt Commissioner. A full text of the minutes of the meeting is annexed to this report (*Annexure-III*).

1.4.2 As decided at the above meeting the minutes were circulated among the members, inviting their further comments|suggestions, which have since been incorporated in the minutes enclosed. This report is based on the above minutes and the detailed discussions which the Study Group had on the terms of reference and the consensus evolved at the meeting.

1.4.3 This report, comprises nine chapters. *Chapter-I* gives an introduction to the constitution of the Study Group, its composition and the Terms of Reference. *Chapter-II* deals, in brief, with the problems of Goitre and Iodine Deficiency Disorders and the importance of supplying the population of the goitre endemic areas with Iodised Salt. *Chapter-III* briefly recapitulates the steps taken by the Government of India to combat Goitre, under the NGCP while *Chapter-IV* describes the processes available for iodisation of salt. The existing systems of production and distribution of iodised salt in India are given in *Chapter-V* while the Government's policy on the subject and the circumstances leading to the policy liberalisation are referred to in *Chapter-VI*. Existing legislation and regulations concerning the production, quality control and distribution of iodised salt form the contents of *Chapter-VII*. The various components that affect the cost of production of iodised salt and the issues relating to the question of payment of subsidy to the private sector including the financial implications are dealt in *Chapter-VIII*. A summary of recommendations of the Study Group is given in *Chapter-IX*.

1.5 The fact that Gotire and other Iodine Deficiency Disorders affect not only the present population but also the unborn has weighed heavy with the Study Group, while considering the task entrusted to it. The population can be saved from the dread of goitre by making available iodised salt, production of which involves a simple method of adding Potassium|Calcium Iodate to Common Salt in a fixed proportion. Under the circumstances, in the best interests of public health of the present and future generations, a small investment should not come in the way and the Study Group sincerely hopes that its recommendations will be accepted by the Government.

1.6 The Study Group places on record the assistance and co-operation extended to it by the Salt Commissioner's Organisation in the holding of the meeting and in preparation of this report.

1.7 The Study Group also appreciates the cooperation extended to it by the Ministry of Health and Family Welfare, the Directorate General of Health Services, Government of India, New Delhi and M|s. Hindustan Salts Limited, Jaipur by making available useful information on the subject, which has been of immense use to the Study Group in its deliberations.

Sd./-
30-12-84
(P. SUBRAMANIAN)
CHAIRMAN

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PLATE-1

IODINE DEFICIENCY CAN PLAY HAVOC

Yet this horrible disease affecting millions can be eradicated by using iodised salt.

CHAPTER II

GOITRE & IODINE DEFICIENCY DISORDERS

2.0 The physical well-being of man calls for the intake of many minerals and trace elements. Iodine is one such element, which is required for the proper functioning of the thyroid gland. The iodine requirements of the human body are supplied through the medium of food and water. About 90 per cent of the total intake of iodine comes from food and the rest from water. However, if the food and water do not supply the minimum required quantity of iodine, it is reflected on the mal-functioning of the thyroid gland, leading to goitre.

2.1 ENDEMIC GOITRE :

Enlargement of the thyroid gland and the associated metabolic changes are considered to be an 'adjustment' of the thyroid gland to the diminished availability of iodine for synthesis of the hormone, *thyroxine*. The enlarged glands lead to nodule formation, which may grow large enough to cause respiratory distresses, necessitating surgery. (Plate-1). Progressive enlargement of the thyroid gland, with the formation of large nodules appear to bring about a gradual reduction in the amount of secreting tissue in adults (40 years of age and over), resulting in *Myxoedema* with its attendant reduction in physical and mental capacity. In highly goitrous regions when the total goitre rate of a poulation rises above 50 per cent, mental defectives and deaf-mutes may constitute 4 per cent or more of the population, causing serious burden to the community, besides posing a challenge to the health services. Lack of proper intake of iodine in pregnant females results in non-availability of *thyroxine* to the foetus, thus affecting the satisfactory functional development of nervous and auditory tissues.

2.2 The World Health Organisation has defined endemic goitre as "enlargement of thyroid gland which is characteristic of a number of people living in a given geographical area and is due to factors that are primarily extrinsic and environmental". This definition, however, does not exclude constitutional factors that may make some persons more susceptible than others due to environmental influences. From public health point of view, goitre is reckoned to have reached *endemic proportions* when 30 per cent or more of the population in a region are affected.

2.3 The immediate cause of endemic goitre is recognised as the failure of the thyroid gland to obtain sufficient quantity of iodine to maintain its normal structure. This assumption has also been confirmed by the modern bio-chemical and radio isotopic methods. But the part played by goitrogenic factors present in a number of food stuffs in the causation of endemic goitre has also become a subject for serious consideration.

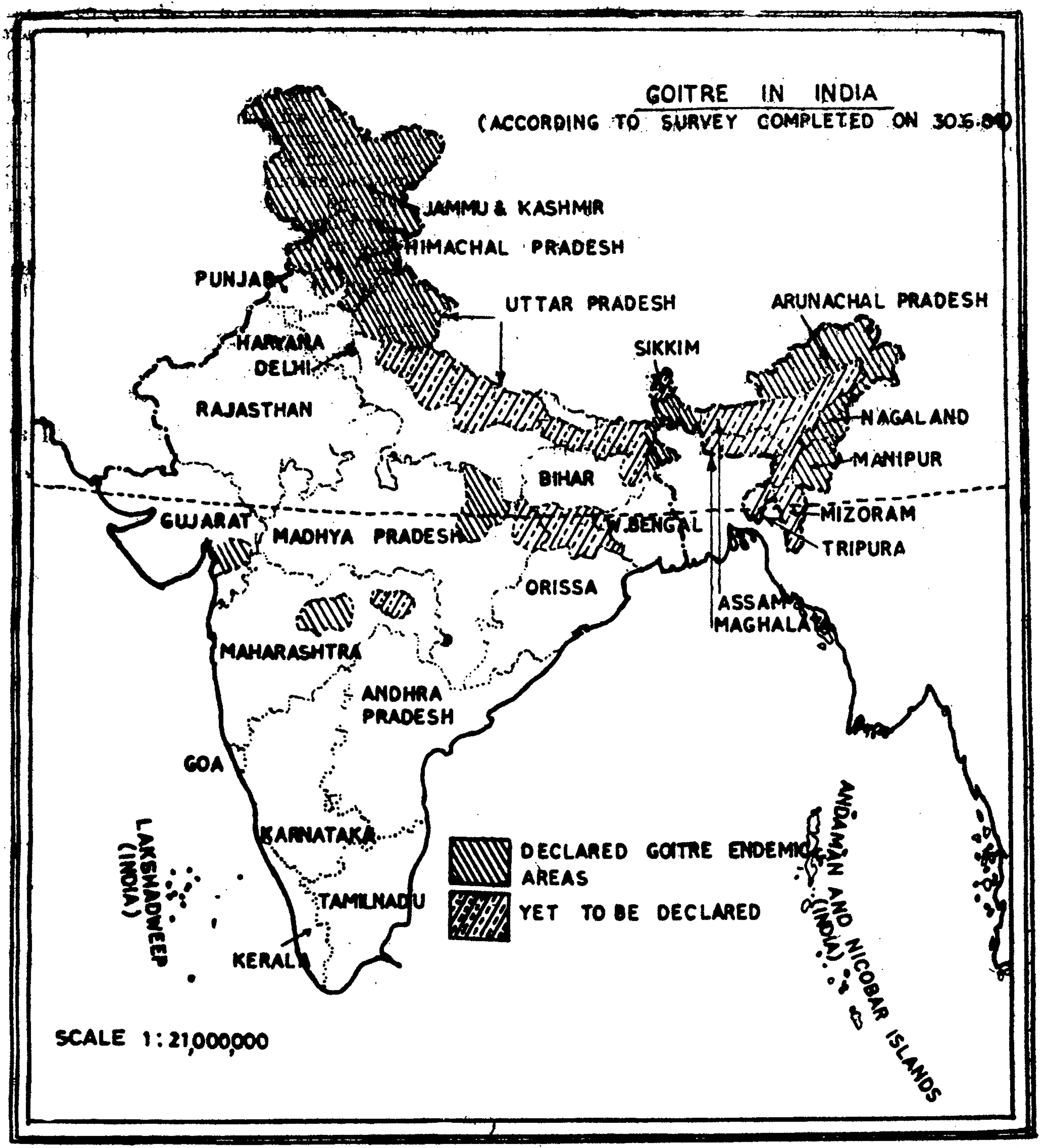
2.4 Although the iodine requirements of man are not known with any degree of precision and the reported estimates vary, the daily dietary allowance of iodine varies from 100 microgrammes for adult to 150 microgrammes to growing children and adolescents and pregnant and lactating women.

2.5 IODINE DEFICIENCY DISORDERS :

It is true that extensive research in different parts of the world where goitre is endemic has shown that iodine deficiency is the chief cause, but the spectrum of iodine deficiency covers also various other serious disorders. At each stage of the human lifecycle, Iodine deficiency has serious effects other than thyroid enlargement and for this spectrum of ill-effects is given the name "Iodine Deficiency Disorders". Though large goitrous swelling causes respiratory distrees due to pressure, haemorrhagic and cystic degeneration in the nodules and hyperthyroidism, endemic-cretinism is proved to be associated with endemic-goitre and severe iodine deficiency. The predominant hyperthyroidism manifests itself in retarded mental development, hearing disabilities, speech disorders, neuromuscular abnormalities, coordination defects & poor physical growth. Iodine deficient communities are reported to show subnormal intellectual performance and motor skill development and poor pregnancy outcome. It has been estimated that about 329 million people in the less developed regions of the world are suffering from goitre (Ref: "From Endemic Goitre to Iodine Deficiency Disorders" in *The Lancet*, November 12, 1983). But similar assessment of the population suffering from other Iodine Deficiency Disorders is more difficult on account of wide-spread occurrence. It is, however, known that Iodine Deficiency Disorders, are not confined to any specific areas but can affect population in any region.

2.6 OCCURRENCE OF GOITRE IN INDIA :

Goitre is found to occur particularly in hilly areas where the rain water strips the soil of its iodine content. Consequently, food crops grown in such soils do not absorb enough iodine from the soil. The endemic goitre belt in India stretches over the entire sub-Himalayan Region and includes the States of Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Bihar, West Bengal, Sikkim, Assam, Arunachal Pradesh, Nagaland, Manipur, Meghalaya and Tripura apart from Punjab, Haryana, the Union Territory of Chandigarh. Endemic Goitre is also found prevalent in certain districts of Madhya Pradesh, Gujarat and Maharashtra (see Map-1). As survey progresses, additional areas are being identified, with goitre-affected population. As the iodine deficiency is



GOITRE IN INDIA
(ACCORDING TO SURVEY COMPLETED ON 30.6.80)

BASED UPON SURVEY OF INDIA MAP WITH THE PERMISSION OF THE SURVEYOR GENERAL OF INDIA

THE TERRITORIAL WATERS OF INDIA EXTEND INTO THE SEA TO A DISTANCE OF TWELVE NAUTICAL MILES MEASURED FROM THE APPROPRIATE BASE LINE

THE BOUNDARY OF MEGHALAYA SHOWN ON THIS MAP IS AS INTERPRETED FORM THE NORTH-EASTERN AREAS (REORGANISATION) ACT, 1971 BUT HAS YET TO BE VERIFIED

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prevalent throughout India, it has to be viewed as a national problem.

2.7 GOITRE CONTROL METHODS :

Several methods have been tried and are used the world over to increase the iodine intake in goitrous areas. These include :—

- Addition of iodine or iodate to salt ;
- Addition of iodine compound to bread ;
- Use of tablets containing potassium iodide ; and
- Administration of iodinated oil.

2.8 CHOICE OF IODISATION AGENT :

The choice of the vehicle for supplementing with iodine depends on the socio-economic development of the goitre endemic region and other practical considerations. A statement showing the methods adopted for supplying the population with iodine in some of the countries of the world may be seen at *Annexure-IV*. In the developing counties, where the population is generally poor and the socio-economic development is not on par with the developed countries of the West, it has been found that mixing of salt with an iodine compound is the best way of supplementing the dietary iodine for the reasons that salt is consumed daily by everyone in fairly constant amounts and mixing of iodine with salt is simple and produces no adverse chemical reaction. For purposes of iodisation of salt, various iodine compounds like potassium iodide, potassium iodate, calcium iodate etc. are being used. But potassium iodate (KIO_3) is usually chosen as the compound to be added to salt owing to its relative stability even in tropical conditions as compared to other iodine compounds. The quantity of iodine supplementation ranges from 150 to 400 micrograms per day, depending on the degee of Goitre endemicity.

2.9 The properties of the iodising chemical are given in Appendices 4 & 5.

CHAPTER—III

NATIONAL GOITRE CONTROL PROGRAMME

3.0 In the Cabinet Meeting held on 19-8-1952, the Ministry of Health was directed to obtain information regarding the methods of iodisation prevalent in other countries for prevention of Goitre and to consider how far such methods could be adopted in India.

3.1 In pursuance of the Cabinet decision in a meeting held in the Directorate General of Health Services, New Delhi on 28-4-1953, the following decisions were taken :—

(a) "Three suitable areas with comparable groups of population numbering about 40,000 be selected to serve as experimental areas (one for supplying common salt fortified with iodide, one with iodate and the third with ordinary salt)."

(b) "A Team may be appointed to carry out an initial survey on representative groups of population in each of the above two 'Control areas' and a final survey after 5 years of continuous supply of iodide|iodate salt."

(c) "For fortification of salt, an Iodisation Plant manufactured by M|s. Alite Machines Ltd. Letchworth, England may be procured. The Salt Commissioner will obtain necessary approval of his Ministry for this purchase."

(d) "The fortified salt will be supplied from Sambhar Lake without any additional Charge."

3.2 The National Goitre Control Programme, therefore, follows a tree-way direction :—

(i) Survey of areas where Goitre is detected;

(ii) Production and supply of iodised salt to 'Endemic' areas to control Goitre ; and

(iii) Resurvey after 5 years, to assess the impact of feeding the endemic areas with iodised salt.

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3.3 Necessary surveys were conducted in the selected areas and a portable dry mixing iodisation Unit was purchased through M|s. Alite Machines Ltd., England and installed at Sambhar Lake on 24-12-1955 at a cost of Rs. 33,056|- (including Rs. 9,335|- being the cost of the building). The capacity of this plant was 5 tonnes per shift of 8 hours i.e. about 1500 tonnes per year on single shift basis. Iodised salt was produced for supply to the selected experimental areas in Kangra District of Himachal Pradesh. Potassium iodide and Potassium iodate were used as iodising agents.

3.4 With the surveys showing satisfactory reult, the Ministry of Health|Directorate General of Health Services took up the matter with the World Health Organisation, leading to the formulation of a Scheme to cover a population of 4 milion in 2 or 3 stages. The Scheme envisaged the supply of iodisation units by UNICEF for installation at Sambhar Lake, Calcutta and Kharaghoda under the administration of the Salt Commissioner; survey of goitrous areas; and manufacture and distribution of iodised salt. *The 'Plan of Operations for Goitre Control Project in India'* was signed at New Delhi on 1-6-1957 between the Government of India, the World Health Organisation and the UNICEF authorities.

3.5 As suitable site, power and technical staff were readily available at Sambhar Lake, it was subsequently decided that to begin with 2 dry mixing type units be supplied by UNICEF for erection at Sambhar Lake to produce 40,000 tonnes of Iodised Salt. By November, 1962, the Plants were installed and poised for production.

3.6 FURTHER EXPANSION :

In September, 1963, the UNICEF authorities addressed the Government of India for supply of additional iodisation plants of spray mixing type. One such unit was installed in Calcutta in early 1965 with an installed capacity of 20,000 tonnes per year on 2-shift basis. This plant was to supply iodised salt to NEFA, Nagaland, Manipur and Bhutan. However, as the off-take from these areas was low as compared to be installed capacity of the plant, it was decided to attach Darjeeling District, (West Bengal) also.

3.7 Subsequently, The UNICEF agreed to offer nine more spray type units to cover the remaining population and it was decided to instal these units at Sambhar Lake, Kharaghoda and Calcutta. Each of these plants cost Rs. 67,700|- (including imported spares and air compressor). The plants were fabricated in India by M|s. Dynacraft of Bombay.

3.8 The installation of the plants supplied by UNICEF was completed in the year 1967-68 and until 1981 there was no further addition to the total number of iodisation plants installed in India. The total installed capacity of these 13 plants amounted to 3,81,600 tonnes per year, on double shift basis. Although demand for iodised salt was increasing due to more endemic areas having come to be identified, the 13 plants were catering to the areas already declared goitre-endemic and where the sale of salt other than iodised salt was banned by the respective State Governments. Statements showing (1) the installed capacities of these 13 plants and

(2) the goitre-endemic areas attached to these plants, appear at Annexures V & VI.

3.9 GAUHATI IODISATION PLANTS :

In 1981 two spray-mixing plants donated by UNICEF were installed at Gauhati in Assam to supply iodised salt, initally to Kamrup and Goalpara districts of Assam. The raw salt was proposed to be supplied for iodisation by the Assam State Co-operative Marketing Federation (STATFED), the sole nominee of Government of Assam, which was also to take delivery of the iodised salt for further distribution. The plants were istalled and commissioned by the Salt Department but due to certain extraneous reasons, the plants could not go into production for some time. The STATFED has since taken over the two plants on 10-8-1984.

3.10 ADDITIONAL AREAS UNDER GOITRE CONTROL PROGRAMME :

The Ministry of Health & Family Welfare, New Delhi have set up a Technical Goitre Review Committee in September, 1979 to undertake surveys|resurveys of the Goitre endemic areas, to accelerate the production of iodised salt by utilising the installed capacity of the existing units in full evolve such plan of operations as are necessary for the effective implementation of the National Goitre Control Programme and to review the expansion of the programme in the identified areas, etc. The aim is to reduce the prevalence rate of Goitre by 50 per cent by 1985; 75 per cent by 1990 and above 95 per cent by 2000 AD. The results so far achieved in some areas (*Annexure—VII*) indicate that the aims are not a fantasy.

3.11 Following the recommendations of the Technical Goitre Review Committee and keeping in view the then existing installed capacities of the iodisation plants, it was agreed to supply iodised salt to Aurangabad District in Maharashtra and Bharuch District in Gujarat from the iodisation units installed at Kharaghoda. The respective State Governments have since issued orders banning sale of salt other than iodised salt in Aurangabad (effective from 1-11-1982) and Bharuch (effective from 5-6-1982).

3.12 The Ministry of Health have also identified the following additional areas for coverage under Goitre Control Programme :—

(1) Assam, Meghalaya, Mizoram & Tripura;

(2) Sidhi, Shahdol, Sarguja and Raigad Districts of Madhya Pradesh;

(3) Deoria, Kheri, Gonda, Bareilly, Rampur, Pilibhit, Shahjahanpur, Gorakhpur, Badaun, Bahraich and Basti Districts of Uttar Pradesh;

(4) Purnea, Saharsa, Katihar, Darbhanga, Madhubani, Sitamarhi and Muzaffarpur, Santal Paraganas, Ranchi, Palamau & Saran Districts of Bihar;

(5) Delhi;

(6) Sikkim;

(7) Tribal areas of Visakhapatnam district in Andhra Pradesh;

(8) Amaraoti and Wardha districts in Maharashtra;

(9) Ernakulam district in Kerala;

(10) Valsad district in Gujarat.

3.13 The requirements of iodised salt of the above areas work out to about 6.24 lakh tonnes annually (*Annexure-VIII*). Thus, the total annual requirements of the areas already declared Goitre endemic and the new areas mentioned above add upto a total of about 9.16 lakh tonnes, whereas the capacities of the existing units, excluding the two plants installed in Gauhati was only 3.86 lakh tonnes on two shift basis. It was, therefore, evident that the existing plants were hardly in a position to cater even 5 per cent of the needs of the Goitre endemic areas so far identified. Further, the plants already in existence have been in operation for a long time and had lost their efficiency due to normal wear and tear. Secondly, these plants were also afflicted by factors such as power shortages. Keeping these factors in view, the Ministry of Health & Family Welfare had proposed to expand the Goitre Control Programme in a big way by installing new Iodisation Plants, during the Sixth Five-Year Plan in a phased programme as under :—

1980-81	2 plants
1981-82	3 plants
1982-83	3 plants
1983-84	3 plants
1984-85	4 plants
Tot	15 plants

3.14 While the Ministry of Health & Family Welfare's above proposal was still under consideration, the matter took a different turn. There has been a pressing demand since quite some time from the private sector to allow it to mparticipate in the Goitre Control Programme by installing Iodisation Plants in the Private Sector in view of the fact that declaring more and more areas as goitre-endemic was robbing the Private Sector of its market for non-iodised salt. The request of the Private Sector was considered time and again but on account of several factors involved, it could not be permitted to participate in the Goitre Control Programme. However, the entire question was later reviewed keeping in view the Government's aim of "Health for all by 2000 A.D." and the alarming increase in the population suffering from Goitre. A reference to the policy liberalisation will be made in the following Chapter.

CHAPTER—IV

POLICY LIBERALISATION

4.0 The handling of production and distribution of iodised salt by only two public sector undertakings, apart from Salt Department had, over the years, come to be criticised by the Salt Manufacturers in the private sector and some of the State owned enterprises who were requesting that they may also be permitted to instal iodisation plants. Further, the installed capacity of the existing plants (3.86 lakh tonnes per annum) was, as already observed, not adequate to meet even 50 per cent of the demands of the already identified Goitre-endemic areas (9 lakh tonnes). Endemic Goitre, which was once restriced to the Sub-Himalayan belt, had started appearing in different parts of India, causing anxiety to the Government. Surveys conducted by the Health Ministry showed that no State in India was free from Goitre, though the prevalence rate varied. From Public Health point of view, a time had, therefore, arisen when a reappraisal of the working of the National Goitre Control Programme was called for.

4.1 In a meeting of the National Goitre Control Review Committee, held on 13-4-1982, the Additional Director General of Health Services said in categorical terms that no part of the country could be considered as totally Goitre free. Taking into consideration the opinions of experts, it was decided at this meeting that—

- the entire country should be declared goitre prone;
- there should be a liberalisation in the policy of production of iodised salt so that iodised salt is freely available to the entire population;
- considering the tremendous deficit in the production of iodised salt, private manufacturers should also be encouraged to produce iodised salt subject to quality control.

4.2 The above decisions mark a major breakthrough in the Government policy concerning the National Goitre Control Programme; a solid resolve to eradicate Goitre and Iodine Deficiency Disorders.

4.3 Following the above decisions, the Government of India in the Ministry of Health and Family Welfare, issued a notification (No. T-24011|5|82-PH dated 16-6-83) permitting commercial production of iodised salt in the Private Sector.

4.4 In pursuance of the above notification, the Salt Commissioner in consultation with the Ministry of Industry formulated the norms and procedures for permitting commercial manufacture of iodised salt in the Private Sector and invited applications from industry. The norms and the terms and conditions under which the licences are granted by the Salt Commissioner may be seen from *Annexure—XIII*.

4.5 Subsequently in a meeting convened by the Secretary, Ministry of Health and Family Welfare, New Delhi, on 15-7-1983 to review the National Goitre Control Programme the Salt Commissioner was entrusted with the responsibility of preparing a time-bound programme for the production of 10 lakh tonnes of iodised salt annually, both in the Public and Private Sectors. It was also decided to launch a campaign to educate the general public through the media of T.V., Radio, etc. on the problems of goitre.

4.6 The Salt Commissioner took immediate action to create adequate installed capacity to step-up the production of iodised salt to meet the demands of the Goitre-endemic areas in full. In the first phase of this andeavour, 139 Units have so far been permitted by the Salt Commissioner with a total installed capacity of 28.78 lakh tonnes. (*See Annexure—IX*).

4.7 A Working Group appointed by the Government of India to go into the questions relating to improvements in salt technology, quality control etc. has also considered the functioning of the National Goitre Control Programme and recommended that in the interest of National health, the edible salt consumed in the country may be iodised in toto, gradually so that every one has access to iodised salt. Keeping the recommendations of the Working Group and the Goitre Control Review Committee in view, it would be necessary to produce a total quantity of 5 million tonnes of iodised salt for human consumption by 1990 and this could be achieved in phases as under —

	(in lakh tonnes)
by 31-3-1986	10
by 31-3-1987	20
by 31-3-1988	30
by 31-3-1989	40
by 31-3-1990	50

4.8 Although the importance and necessity of iodising the entire kitchen salt used in India has been spearately stressed at the various forums, and the private sector has been liberally permitted to establish iodisation plants over the past one year, the efforts are yet to reflect in performance. The slow progress in the setting up of iodisation plants in the private sector has been realised as due to absence of any incentives. This observation was also voiced by the Joint Secretary, Ministry of Industry at the meeting of the Goitre Control Review Committee held on 17-7-1984 when he said that it may be necessary to to the manufacturers. He apprehended that the Goitre Control Programme may not achieve the desired results in the absence of such subsidy. It was also brought out at this meeting that as the level of iodisation at the manufacturing end was proposed to be increased to 40 ppm (iodine) from the current level of 15 ppm (iodine) it may not be economically possible for the private manufacturers to undertake commercial production of iodised salt. The factors involved were :—

(i) additional cost of iodisation which the private sector was prohibited from passing on to the consumers;

(ii) expenditure in maintaining laboratory facilities for quality control;

(iii) additional cost of packing iodised salt in polythene jute bags or HDPE bags and in consumer packs.

These and other factors having a direct bearing on the cost of production of iodised salt in the private sector are entrusted for study by this Study Group for its recommendations.

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CHAPTER—V

PROCESS OF IODISATION OF SALT

5.0. The means of supplementing dietary iodine is determined by factors such as the socio-economic development of the community and other practical considerations. The vehicle should not only be cheap but should be an item of mass consumption in certain constant quantities to ensure the in-take of a definite quantity of iodine each day. Hence, in Indian conditions, iodisation of bread or the distribution of tablets containing iodine or the iodisation of vegetable oils is not considered feasible. This leaves common salt as the only 'vehicle' for iodisation and distribution among the goitre-endemic areas. Iodised salt is widely used for the purpose even in industrialised countries.

5.1 Iodisation of salt could be accomplished by one or more of the following processes :—

— Dry mixing;
— Spray mixing process; and
— Submersion process.

The choice of the process for iodisation of salt depends on various factors and each process has its own merits and demerits. The process chosen should, however, aim at achieving a perfect blending of common salt with an iodine compound to ensure the desired level of iodine. As the figures furnished in Annexure—IV would indicate, there is no universal specification for the level of iodisation. The latter depends on the degree of Goitre-endemicity of a given region, the extent of recoupment required to make good the iodine deficiency, a provision to make good the iodine deficiency, a provision to take care of any iodine losses from the point of production of iodised salt to its consumption in the Goitre-endemic areas etc. Keeping these factors in view, the level of iodisation in India was fixed at 25 ppm i.e. 1 part of Potassium iodate in 40,000 parts of salt. The aim of the iodisation process was, therefore, to achieve this level. The three processes mentioned above are described below :—

5.2 DRY MIXING PROCESS

In the Dry Mixing Proces, a stock mixture of Potassium iodate and anti-caking chemicals like Tri-calcium phosphate or Calcium Carbonate is prepared in proportion of 1:10. The stock mixture is again mixed with 10 parts of free flowing Sodium Chloride, the entire pre-mix passing through 180 mircon 15 sieve. The salt to be iodised is fed into a hopper of bulk controller and passes into an enclosed worm screw mixer. At a point near the base of the bulk controller a mixture of Potassium Iodate and anti-caking agent is fed into the worm-screw mixer conveyor through a process feeder so as to give the desired quality of iodised salt.

5.3 SPRAY MIXING PROCESS

In the Spray Mixing Process, salt in crystalline or in crushed form, is dumped into a feed hopper (see Plates 2 & 3). A stainless steel wire-mesh (3′ × 3′6″) fitted to the hopper screen off lumps of salt and prevents gunny bags|baskets being draw-in. From the fed hopper the salt is carried by an inclined rubber belt conveyor moving at a speed of 100 ft. per minute. The Salt is discharged from the belt conveyor into a mixing chamber at the rate of 5 tonnes per hour.

5.3.1 A 3 per cent aqueous solution of Potassium iodate KIO_3 is sprayed through special type of stainless nozzles designed to deliver a flattened spray that spreads over the entire width of the salt stream falling from the belt. The iodate solution is held under pressure in a stainless steel drum of 80 litres capacity. The pressure in the storage drum is maintained at 20 p.s.i. with the help of an air compressor equipped with a regulator.

5.3.2 The Salt crystals unevenly wetted with KIO_3 solution are mixed thoroughly by a stainless steel screw (9″ dia). which pushes out the iodised salt through twin outlets for bagging. (For process details please see Appendix—I).

5.4 SUBMERSION PROCESS

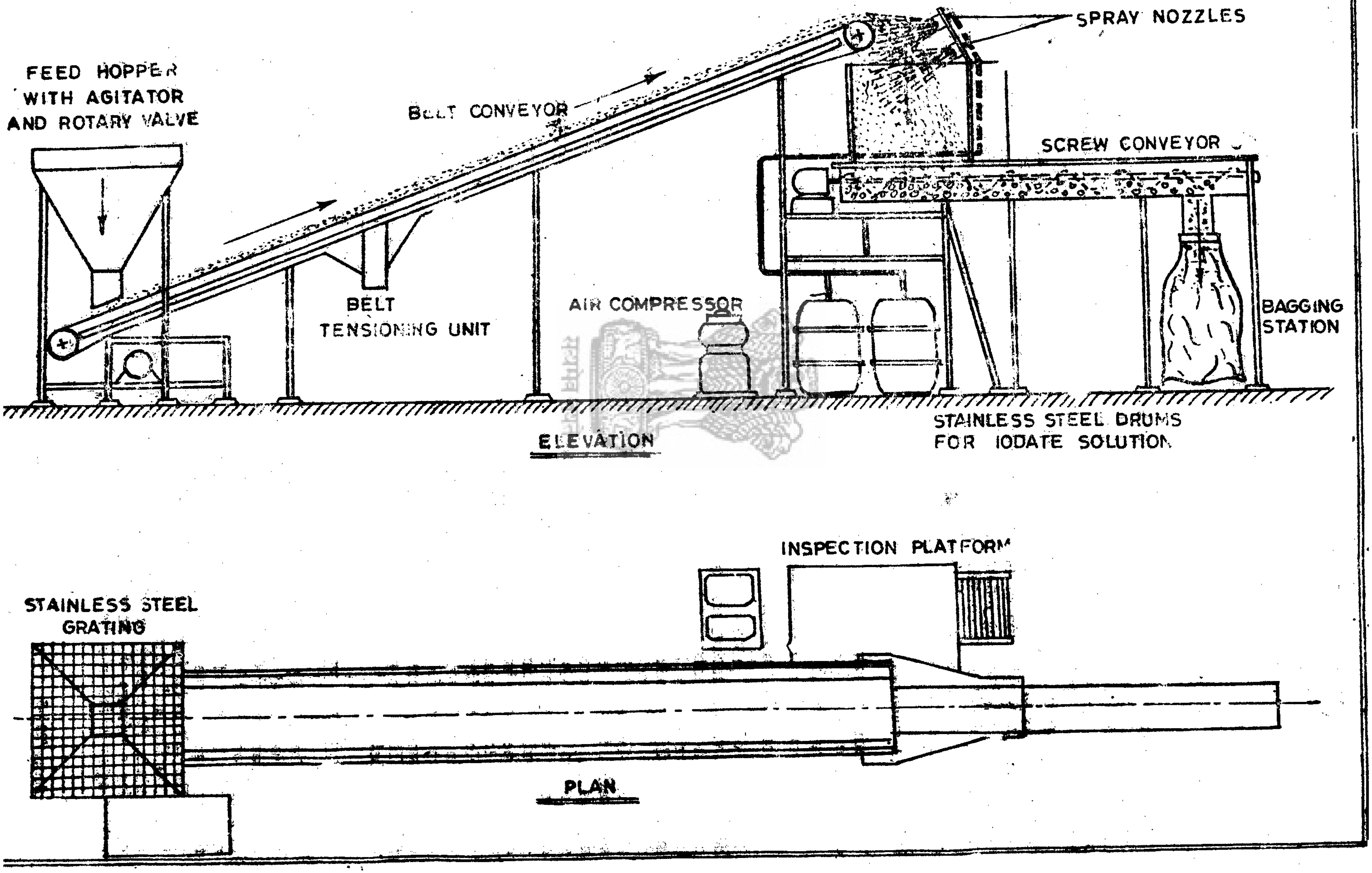
In this process, developed by the CSMCRI, Bhavnagar common salt is dumped into shallow cement tanks (see Plate-4) either manually or by mechanical means. A saturated solution of Sodium Chloride in which a fixed quantity of Potassium or Calcium Iodate is added is then let into the tank till the salt is completely submerged with the solution. After allowing a contact period of about 5 minutes, the solution is discharged into a settling tank from where it is pumped out for recycling, after the impurities settle down.

5.4.1 The wet iodised salt is taken out from the submersion tank, heaped and allowed to stay overnight for draining off the remnant solution. Thereafter the salt is spread out to dry for crushing, if need be, and bagging. Submersion process avoids the use of any large scale mechanical applicances except diesel|electrically operated pumps and is aimed at a uniform distribution of iodine on the salt crystals. (For process details please see Appendix—2).

5.5 After working for several years on the dry mixing process, it has been experienced that it is not

PLATE-2

SALT IODISATION - SPRAY MIXING PLANT

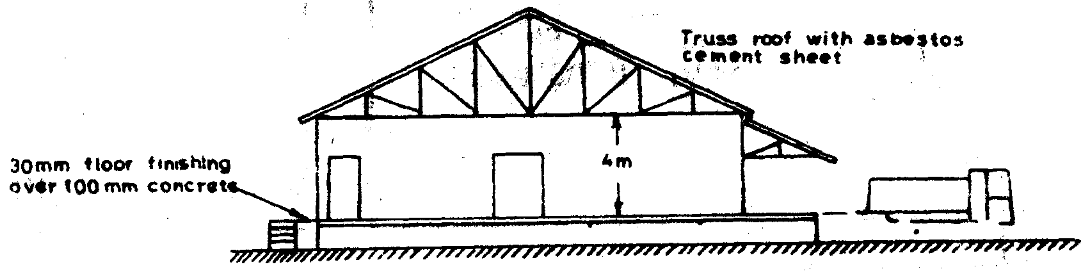


ELEVATION

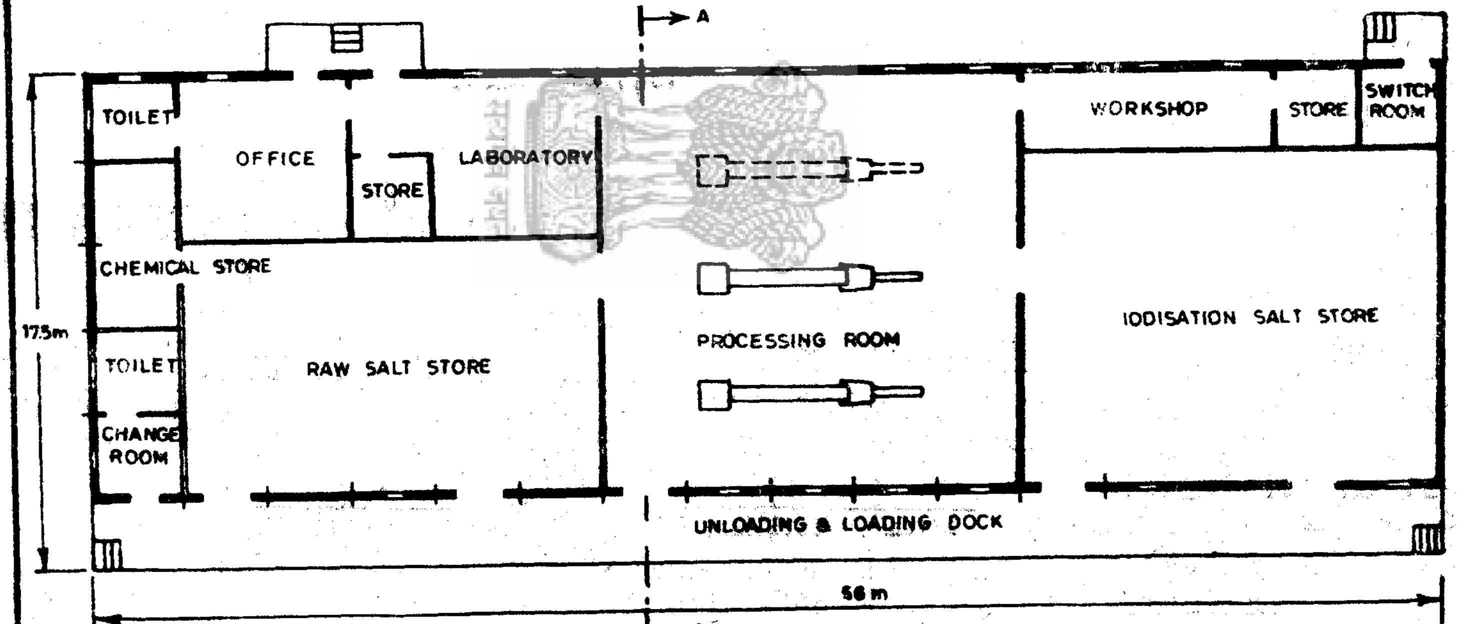
PLAN

PLATE-3

LAYOUT OF A SALT IODISATION PLANT


Truss roof with asbestos cement sheet
4m
30mm floor finishing over 100 mm concrete

SECTION A-A

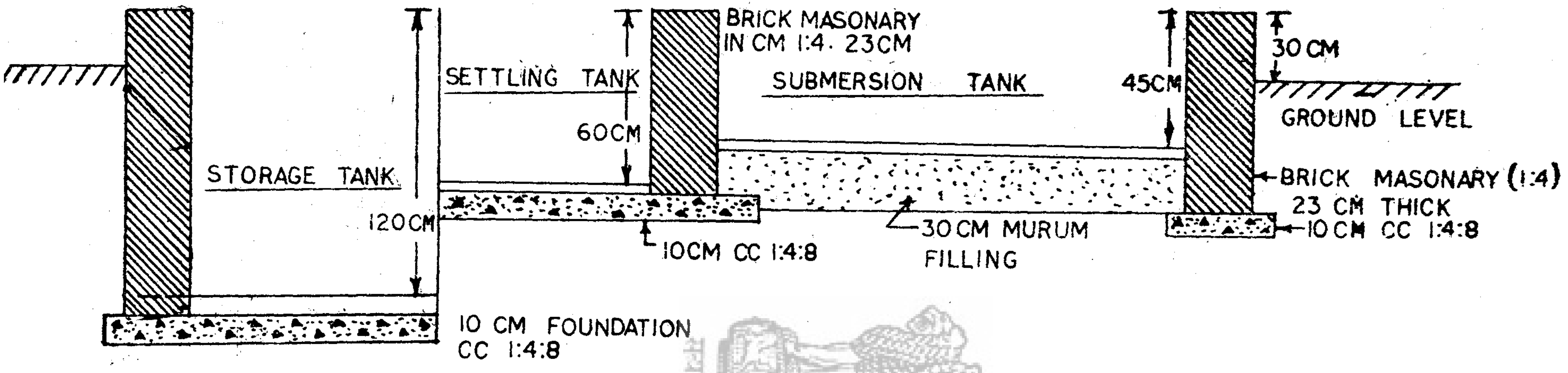


PLAN

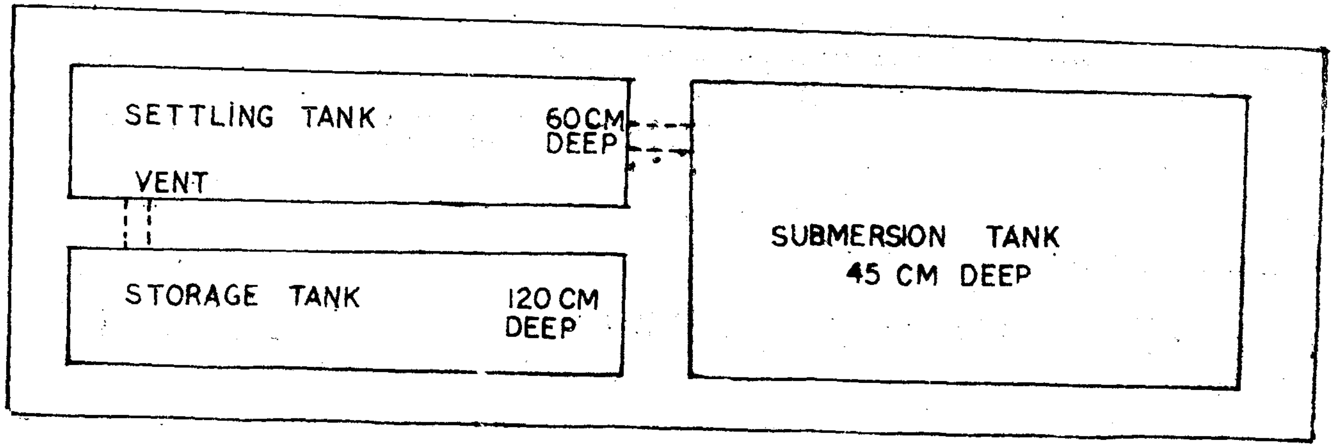
PLATE-4

SUBMERSION PROCESS FOR IODIZATION OF SALT

SCHEMATIC DIAGRAM OF THE PLANT (NOT TO SCALE)



CROSS SECTION



PLAN

possible to obtain a uniform distribution of iodine unlike in the Submersion and|or Spray mixing processes, as the fine iodate compound tends to settle at the bottom of the container.

5.6 While the dry mixing process has almost been abandoned inspite of the existence of two dry mixing plants at Sambhar Lake, the iodisation Units in the public sector follow the spray mixing process. At the instance of the CSMCRI, which has standardised the submersion process a joint study of the comparative cost of iodisation by the submersion and the Spray processes was conducted jointly by the Salt Department, CSMCRI and M|s. Hindustan Salts Limited at Sambhar Lake in the year 1982.

5.7 A statement showing the findings
study is enclosed at Annexure X. It w
served from the figures provided in th
that production of iodised salt by subme
is definitely costlier. Further, submersi
cannot be adopted round the year and
number of working days to about 150
while the best method available for
salt in India is the Spray process, part
iodising bulk quantities round the year,
sion process could be adopted by ind
manufactures who wish to produce limit
of iodised salt.

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CHAPTER VI

PRODUCTION AND DISTRIBUTION OF IODISED SALT IN INDIA

6.0 The production of iodised salt upto 1983 was confined to Public Sector Units at Sambhar Lake, Kharaghoda and Salkia Salt Golah, Howrah. The installed capacities of these Units and the production of iodised salt at these sources during 1979 to 1984 (upto November) are given below :—

(Please also see Annexure-V & XI).

Unit	Annual installed capacity '000 tonnes	Annual production of iodised salt ('000 tonnes)) during 1981	1982	1983	1984*
1. Sambhar Lake	185.4	84.10 (45.36)	100.20 (54.05)	67.29 (36.29)	57.68 (33.94)
2. Kharaghoda	115.2	115.30 (100.00)	90.40 (78.47)	108.78 (94.45)	111.65 (105.73)
3. Howrah	81.0	27.80 (34.32)	23.20 (28.64)	27.99 (34.56)	23.63 (31.82)
Total	381.6	227.20	213.80	204.06	192.96

*Upto November, 1984

[Figures in brackets indicate percentage capacity utilisation.]

While iodisation units at Sambhar Lake and Kharaghoda are worked by M|s. Sambhar Salts Ltd. and M|s. Hindustan Salts Limited respectively, the plants at Howrah are worked by the Salt Department.

6.1 PROCUREMENT & SUPPLY OF POTASSIUM IODATE :

Upto 1967, UNICEF used to arrange the supply of imported potassium iodate against rupee payment. But from 1968, crude iodine is being imported and got converted into potassium iodate through local chemical firms. This job is presently being handled by M|s. Hindustan Salts Limited which imports (on OGL) crude iodine, taking into account the requirements of all the plants in the public sector, gets it converted into potassium iodate and meet the demands of potassium iodate of all the 3 Units. One kilogram of iodine will yield, on conversion, 1.55 kgs. of potassium iodate.

6.2 PRODUCTION & SUPPLY OF IODISED SALT :

Based on the population statistics and per capita consumption of 6 kgs., the requirements of iodised salt of the various goitre endemic areas are worked out by the Salt Commissioner. The area-wise requirements of iodised salt so worked out are communicated to the State Governments concerned, the Railways, and the iodisation plant authorities for implementation. As the sale of edible salt, other than iodised salt is banned by legislation in the goitre-endemic areas, the responsibility of procuring and arranging the distribution of adequate quantities of iodised salt in such areas, rests with the concerned State Governments. Such effective distribution is essential to avoid infiltration of non-iodised salt into goitre-endemic areas and for proper control of goitre. The annual 'quota' of each goitre endemic area is, therefore, distributed by the Civil Supplies Departments concerned among the duly appointed nominees for procurement from the iodisation units to which the areas are attached. As per the procedure followed by M|s. Hindustan Salts Limited and M|s. Sambhar Salts Limited, the nominees are to deposit with the plant authorities the cost of the Salt and other incidental expenses and also supply empty Gunny bags to enable the plant authorities to comply with the indents. At Howrah, the nominees have to purchase Salt from the stockists of the Salkia Salt Golah and supply it to the plant authorities for iodisation. The working of the Howrah plants, therefore, entirely depends on the nominees, the power supply position and the Railways. To take care of the acute power shortage in Howrah, a diesel generating set has also been installed at the Salkia Salt Golahs, Howrah. Inspite of these constraints, the Asstt. Salt Commissioner, Calcutta programmes the supply of the iodised salt to the areas attached to the plants in such a manner as to ensure equitable distribution.

6.3 PACKING :

Iodised salt is supplied in packed gunny bags of 75 kg. capacity with appropriate labelling. Polythene lined jute bags or HDPE bags are seldom used at the three public sector units. The choice of packing material does, however, not lie with the plant authorities but depends upon the nominees.

6.4 DISTRIBUTION :

Under the P.T. schedule of the Railways, iodised salt is moved under priority 'B' i.e. on a higher priority than non-iodised salt. The despatches of iodised salt from Kharaghoda and Sambhar Lake invariably take place by Railway wagons and from Howrah both by Rail and Road as the destinations are nearby. The supplies of iodised salt to the various goitre endemic areas are closely watched by the Salt Commissioner, who takes appropriate action in addressing the State Governments, Railways and the Plant Authorities in case the supplies to any given area is found to be inadequate. Meetings are also arranged frequently to sort out specific problems with the

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representatives of the States concerned and the Railways. A statement showing the supplies of iodised salt during the years 1979 to 1984 (upto November, 1984) appears at Annexure XII. The statement would reveal that the supplies are inadequate to some of the areas.

6.5 Problems in maintaining adequate supplies of iodised salt to goitre endemic areas are identified to fall into the following categories :—

— Non-placement of timely and workable indents by the nominees with the Plan Authorities ;

— Non-supply of wagons by the Railways either for want of empties or due to imposition of operational restrictions ;

— Supply of open wagons by the Railways, which are not acceptable to the nominees ;

— Power shortage at the iodisation plants, resulting in 'idling' of the plants; and

— Infiltration of non-iodised salt into the 'Sealed Areas', thereby reducing the demand for iodised salt.

The nature of the problems listed above call for a co-ordinated effort among the plant authorities and the State Governments concerned. The role of the Salt Commissioner is much more important in this regard in as much as he had to ensure that the Goitre Control Programme is properly implemented by maintaining a close liaison with the Railways, State Governments and the Units.

6.6 Since the liberalisation of the Policy and permitting of private sector to undertake manufacture of iodised salt, nine units have gone into production of iodised salt, reaching a production of about 18,000 tonnes during 1984 (upto November).

CHAPTER VII

LEGISLATION AND REGULATIONS

7.0 NEED FOR LEGISLATION :

The effective combat of goitre depends upon two factors : a proper iodisation and the presence of the prescribed quantity of iodine in the salt at the time of its consumption and the maintenance of regular supplies of iodised salt to the affected population. The aims of the National Goitre Control Programme and the expenditure incurred on the programme would prove a waste if the iodised salt does not contain the desired minimum of iodine when consumed and if the affected population finds access to non-iodised salt also. Hence, it is necessary to regulate, by legislation, the levels of iodine at the manufacturing and consuming ends and the sale and distribution of iodised salt in the goitre-endemic areas.

7.1 THE PREVENTION OF FOOD ADULTERATION ACT, 1954

With a view to prohibiting the availability of non-iodised salt to the consuming public in the goitre-endemic areas and to promote the consumption of only iodised salt, the Government of India have authorised the State Governments to issue notifications under PFA Act, 1954 banning the sale and distribution of salt other than iodised salt for human consumption in the goitre-endemic areas. A typical such notification appears at Annexure XIV of this Report.

7.2 The notification issued under the PFA Act, however, prohibits the *sale of Salt* other than iodised salt in a given territory as an item of food. The *entry* of non-iodised salt as such is not prohibited. Thus, any person could still carry non-iodised salt into the goitre-endemic areas despite the ban and offer it for other purposes viz., curing of hides and skins, as preservative or for use as freezing mixture etc. Owing to this lacuna, there is always the possibility of gullible public using non-iodised salt for edible purposes also, particularly when it is available at a lesser price. Although there is a need to suitably amend the provisions of the Act, the Study Group feels that in view of the Government's decision to iodise the entire edible salt by 1990, there is no need to disturb the situation for the present.

7.3 The PFA Rules, 1955 also define the edible common salt (A. 15 to Appendix-B) and also stipulate that iodised salt should contain 25-35 ppm of Potassium Iodate at the manufacturing level and 15 ppm at the consuming level. (Annexure-XV). The officials of the Food & Civil Supplies Department of the State Governments concerned are authorised to draw samples at the retail level and if, on analysis, the samples are found to contain less than 15 ppm of KIO_3, launch prosecutions against both the retailer/stockist and the manufacturer. In view of the delays involved in the transport of iodised salt from the producing centres to far flung consuming centres and the hazards of transpor and handling, the iodised salt producers complain that even if they maintain the level of iodisation, the salt might get stripped of the iodine wholly or in part by the time samples are drawn and analysed. They, therefore, feel threatened of the prospects of prosecution for no fault of theirs.

7.4 Keeping the experience of the public sector iodisation units in view, the Ministry of Health have now proposed to amend the specifications for iodised salt under PFA Act by which the iodine content in salt shall not be less than 40 ppm at the manufacturing and 15 ppm at the consumer ends. The proposed amendment is expected to take care of the possible iodine losses during transport, handling, storage, etc.

7.5 I.S.I. SPECIFICATION FOR IODISED SALT :

(IS: 7224-1973 with amendment No. 1, April, 1982)

The Indian Standards Institution have prescribed the following standards for Iodised Salt :—

Sr. No.	Characteristic	Requirement
1.	Water soluble matter, percent by mass *Maximum*	1.0
2.	Chloride content (as NaCl) percent by mass, *Minimum*	96.0
3.	Matter soluble in water, other than Sodium Chloride, percent by mass, *Maximum*	3.0
4.	pH	7.5 to 8.0
5.	Iodine content, ppm	35—40
6.	Keeping quality	The iodine content shall not be lower than 15 ppm within one year of manufacture.
7.	Particle size	99% of the material shall preferably pass through 1.00 mm IS Sieve.

The above standards are under review by the Indian Standards Institution.

7.6 CENTRAL EXCISE & SALT ACT, 1944 ·

Manufacture of salt is subject to licensing in

India, except in the case of persons covered by the Government of India Press Note dated 23-4-1948. The Salt Commissioner to the Government of India is the licensing authority. To ensure that after 1990 all the salt produced in India and offered for human consumption is iodised, amendments will have to be made in the provisions of the Central Excise & Salt Act, 1944, and the Rules made thereunder; the Salt Cess Act, 1953 and the Rules made thereunder and the conditions of licence. Similarly, the Government of India Press Note dated 23-4-1948, as amended from time to time, should also be amended further so that even the salt produced in the non-licenced sector and offered for human consumption is also compulsorily iodised from 1990 onwards.

7.7 Different State Governments have also leased out/have been leasing their lands for salt manufacture to private parties and public/joint sector undertakings. With a view to seeing that the provisions of such leases do not clash with the amended provisions of the Central Excise & Salt Act, etc. as mentioned above, the State Governments should be requested to amend their lease conditions accordingly.

7.8 With the proposed amendments to the PFA Act and the Central Excise & Salt Act, it would be necessary to ensure that all the salt produced and offered for human consumption is iodised and conforms, at the manufacturing level, to the standards. Such careful monitoring is quite essential for achieving the aims of iodising the entire edible salt by 1990. The Salt Commissioner's Organisation which has a network of field officers in all parts of the country, should be adequately strengthened to enforce the requirements and afford guidance to the manufacture of iodised salt.

CHAPTER—VIII

SUBSIDY

8.0 QUESTION WHETHER SUBSIDY IS NECESSARY :

8.1 Under the National Goitre Control Programme, not only the cost of the iodisation plants set up in the public sector has been borne by the Government but the entire cost of iodisation incurred by the Public Sector units has been reimbursed to them by the Ministry of Health and Family Welfare, with a view to seeing that the population of the goitre-endemic areas get iodised salt at no extra cost and at the same time, the public sector units are not made to suffer losses in keeping the prices of iodised salt on par with non-iodised salt. Maintaining the prices of iodised salt on par with non-iodised salt is also necessary to ensure that the illiterate and poorer sections of the population of goitre endemic areas do not resort to purchasing and consuming non-iodised salt which might be available at cheaper price.

8.2 When it was decided to allow the private sector also to produce iodised salt, it was to make good the short supplies from the public sector units and also to feed the additional goitre-endemic areas. When goitre and Iodine Deficiency Disorders made their prevalence felt even in non-traditional areas of the country and the threat of the entire population of the country suffering from IDD loomed large, the Government took a decision to iodise the entire edible salt by 1990. This could, however, not be achieved overnight in as much as the iodisation of the entire edible salt calls for the installation of a large number of plants and the import of substantial quantities of iodine. While compulsory iodisation of all edible salt was not, therefore, an immediate possibility, it has been decided to go about it in stages. In view of the investment involved in setting up the plants and the additional operational expenses of iodisation on one hand and the competition from cheaper non-iodised salt on the other, the response from the private sector has not been very encouraging, eventhough as many as 139 parties have been licensed by the Salt Commissioner upto 31-8-1984. Subsidising the production of iodised salt and/or affording financial assistance to the private parties till 1990, therefore, seems inevitable for a successful implementation of the Government's decision.

8.3 STRUCTURE OF SALT INDUSTRY :

8.3.1 *Salt Industry in India falls in two sectors :*

(a) Licensed sector, and

(b) Non-licensed sector

8.3.2 *Licensed Sector (Category I, II & III)*

The salt manufacturers (both in the public and private sector) holding licences issued by the Salt Commissioner under the Central Excise & Salt Act, 1944 and the Rules made thereunder, fall into the following Categories :—

Category-I	Salt manufacturers holding licensed area exceeding 100 acres in extent.
Category-II	Salt manufacturers holding licensed areas exceeding 10 acres but not exceeding 100 acres in extent.
Category-III	Salt manufacturers holding licensed areas upto 10 acres.

8.3.3 Co-operative Societies engaged in salt manufacture are categorised accordingly, depending on the share of each individual member in the licensed area of a given society.

8.3.4 *Non-licensed Sector (Category-IV)*

Under the Government of India Press Note dated April 23, 1948, as amended from time to time, individuals or groups of individuals were allowed to undertake salt manufacture without a licence, provided that they had legal access to the land and provided the area in each case did not exceed 10 acres. The persons manufacturing salt under the 10-acre concession granted under the above Government of India Press Note fall in Category-IV.

8.3.5 *Number of Salt Manufacturing Units*

The number of Units under salt manufacture in terms of the above classification is as follows :—

Year	Number of Units (Category-wise)					
	Cat.-I	Cat.-II	Cat.-III	Co-ops.	Cat.-IV	Total
1981	400	683	2474	169	6351	10077
1982	442	703	2337	183	6880	10545
1983	448	699	2312	219	6404	10082

8.4 The Category-wise production of salt during the years 1981, 1982 and 1983 has been as under :—

(Figures in '000 tonnes)

	1981	1982	1983
Category-I	5033	4030	4213
Category-II	1014	907	693
Category-III	244	255	212
Co-operatives	1311	758	506
Category-IV (non-licensed)	1321	1358	1381
Total	8923	7308	7005

8.5 In the total production of salt in the country, the relative contribution of the above categories of salt manufacturers follows the pattern :—

Category-I (public & private) (large scale)	60%
Category-II & III (small & medium scale)	14%
Co-operative Sector	8%
Non-licensed Sector Category-IV	18%
Total	100%

8.6 With a major portion of the production from the Category-I salt manufacturers being industrial grade salt, a bulk of the salt meant for human consumption is met by the small and medium scale categories of salt manufacturers, the co-operative societies and non-licensed sector (Categories-II, III & IV). There are as many as 10,000 individual salt manufacturers among these categories, whose holdings are too small and who are economically backward. The Salt Works of these small-scale salt manufacturers are scattered in all the salt producing States, on account of which a sizeable production from this sector is not available at a given location. Unless these manufacturers are afforded necessary financial assistance and technical guidance, it will be impossible to ensure the iodisation of salt produced in this sector. Again, unless the multitude of small-scale salt manufacturers form associations or Co-operatives, it would be impossible, even with financial assistance from the Government for a bulk of them to set up iodisation plants to be worked with their own produce.

8.7 TARGET OF PRODUCTION FOR IODISED SALT

8.7.1 Based on the population projections of the Planning Commission and @6 kg., per capita, the total demand of salt for human consumption is estimated to reach about 50 lakh tonnes by 1990. Keeping in view the aim of iodising the entire edible salt requirements of the population by 1990, it is recommended to achieve the objective in a phased manner during the Seventh Five-Year Plan period as under :—

	(in lakh tonnes)
by 1985-86	10
by 1986-87	20
by 1987-88	30
by 1988-89	40
by 1989-90	50

8.8 SUBSIDY :

8.8.1 *Plant & Machinery*

As earlier observed, there are two processes available for production of iodised salt : the Spray-mixing Process and the Submersion Process.

8.8.2 *Spray-mixing Process*

On the basis of market survey conducted by the Salt Commissioner, it has been observed that a spray-mixing type of plant with 10,000 t.p.a (on single shift basis) could be got fabricated indigenously and installed at a cost of about Rs. 4 lakhs. This assumption is based on the quotations received by the Salt Commissioner from various indigenous fabricators (A list showing the names and address of Iodisation Plant fabricators appears at *Annexure-XVI*). With increasing number of plants coming up in the course of the next few years, the Study Group feels that more and more indigenous fabricators would enter the field and the total cost of a spray-mixing type of plant could be maintained at Rs. 4 lakhs, including installation charges and accessories.

8.8.3 As to the question whether a crusher|grinder should form and be treated as an integral part of an iodisation plant of the Spray-mixing type, the Study Group feels that in as much as the salt crystals should be reduced to an optimum particle size for effective iodisation, the crusher|grinder should form a necessary accessory of the iodisation plant. The Study Group's attention was also invited in this connection to the proposed ISI specifications (2nd amendment) for Iodised Salt, according to which 95 per cent of the material is to pass through 4 mm IS Sieve. A crusher|grinder with a capacity of 5 tonnes per hour could be obtained for about Rs. 1 lakh. Thus, the total cost of an integrated spray-mixing unit (10,000 tpa) (on single-shift basis) was assessed at Rs. 5 lakhs for purposes of calculating the subsidy.

8.8.4 *Submersion Process*

While the establishment of a Spray-mixing type of plant calls for a minimum production capacity of 15,000 to 20,000 tonnes of salt, a submersion process plant could be set up even by individual salt manufacturers, whose annual production does not exceed 5,000 tonnes. Further, the plants operating on this process do not call for any elaborate plant and machinery. A Submersion process plant with 5,000 tpa capacity could be set up at a cost not exceeding Rs. 20,000.

8.8.5 Inspite of its proven suitableness for production of iodised salt, the submersion process suffers from certain inherent drawbacks viz. being a batch process and involves wetting of the salt and overnight draining and drying, etc., it cannot be adopted particularly in coastal areas where the relative humidity is high. Secondly, the units working on Submersion Process could be worked only during fair weather, and this restricts its operational period. Still, five installations based on Submersion process have come up in Rajasthan (total capacity 77,000 tonnes) where the weather conditions are favourable, but the Study Group does not expect any substantial number of Submersion process based iodisation plants coming up in the other parts of the country. In view of the simplicity of operation and versatility, the Study Group is of the opinion that about 80 per cent of the iodised salt required in future would be produced by using Spray-mixing type of plants.

8.8.6 Considering the problem posed by the numerous small-scale salt manufacturers (Category-II, III & IV) whose individual production is not enough to feed a spray-mixing plant and who do not possess the wherewithal to instal such plants, the Study Group emphasizes that in areas where there is a concentration of small scale salt manufacturers (Category-II, III & IV), the Salt Dept. should set up iodisation plants adopting the spray-mixing type. Such plants would act demonstration units besides serving as Extension Centres at which the small-scale salt manufacturers could get their salt iodised. The Study Group desires that the Salt Department may work such units for 3 to 5 years, during which time the Salt Department may train the Salt Manufacturers in operating such plants and also promote the formation of associations or Co-operative Societies of the small-scale salt manufacturers so that at the end of the 3-5 year period the plants could be handed over to such Associations|Co-operatives for future operation and maintenance.

8.8.7 *Assistance towards Plant & Machinery*:

In regard to the question of granting financial assistance to the private sector for the installation of iodisation plants, the Study Group opines that the large-scale salt manufacturers (Category-I) were not only better placed financially but also have certain social responsibilities to discharge. Hence, such salt manufacturers may be given, as an incentive, only soft loans with nominal rates of interest, to cover service charges, for installation of iodisation plants. The loan for installation of an integrated Spray-mixing type of plant may not exceed Rs. 5 lakhs and shall be recoverable in ten equal annual instalments.

8.8.8 In so far as the small and medium-scale salt manufacturers (Category-II, III & IV) are concerned, whose economic status is weak and who cannot afford the required capital on their own nor have the capacity to take a loan liability, the Study Group recommends that the entire cost of installation of iodisation plants be met by the Government as subsidy. Such assistance shall, however, be limited to Rs. 5 lakhs for each integrated spray-mixing type of plant and Rs. 20,000 for a plant adopting the submersion process. This facility shall be available to both individual licensed salt manufacturers or their Associations and Co-operative Societies and shall also be extended to the non-licensed sector.

8.8.9 With a view, however, to attract a maximum number of salt manufacturers and Co-operative Societies in the initial years of the 7th Five Year Plan, the Study Group suggests that the financial assistance mentioned above may be offered in full (100 per cent) in the beginning, tapering off towards the end of the Plan period. Thus, the assistance may be of the following pattern :—

—For plants set up upto 31-3-1988	100% assistance (both loan & subsidy)
—For plants set up during 1-4-1988 to 31-3-1989	50% assistance (both loan & subsidy)
—For plants set up during 1-4-1989 to 31-3-1990	25% assistance (both loan & subsidy)

8.8.10 The Study Group also foresees the establishment of a maximum number of iodisation plants adopting the Spray-process. In view of the graded assistance recommended, the Study Group hopes that atleast 80 per cent of the required capacity will be established before 31-3-1988 and 20 per cent in the 4th & 5th years of the Plan period.

8.8.11 *The total number of plants to be established to achieve the annual targets work out as under :—*

Year	Total Qty. of salt to be iodised (in lakh tonnes)	Iodisation capacity established in the beginning of the year (in lakh tonnes)	Iodisation capacity to be established during the year (in lakh tonnes)	No. of spray plants (10000tpa) to be established to achieve the capacity in Col. (4)
1	2	3	4	5
1985-86	10	6	4	40
1986-87	20	10	10	100
1987-88	30	20	10	100
1988-89	40	30	10	100
1989-90	50	40	10	100

8.8.12 On the basis of the above figures and assuming that 40 per cent of the plants will be established by the major salt manufacturers (Category-I), two plants by the Salt Department during 1985-86 and 3 in 1986-87 and the remaining plants by the small and medium-scale salt manufacturers (Category-II, III & IV), the annual programme works out as under :—

Year	Total No. of plants to be set-up	No. of plants proposed to be set up by the Salt department	By Cat. I mfrs.	By small & medium-scale mfrs. (Cat. II, III & IV)
1985-86	40	2	16	22
1986-87	100	3	40	57
1987-88	100	—	40	60
1988-89	100	—	40	60
1989-90	100	—	40	60
Total	440	5	176	259

8.8.13 On the basis of the foregoing considerations, the capital outlay towards the establishment of Demonstration Units|Extension Centres and for payment of Loans and Subsidy to the private sector is estimated as under :—

Year	No. of plants and capital outlay							
	Salt Dept.		Category-I salt mtrs.		Small & medium scale-mfrs.		Total	
	No.	outlay (Rs. in lakhs)	No.	outlay (Rs. in lakhs)	No.	outlay (Rs. in lakhs)	No. of plants	outlay (Rs. in lakhs)
1985-86	2	10	16	80	22	110	40	200
1986-87	3	15	72	360	105	525	180	900
1987-88	—	—	72	360	108	540	180	900
1988-89	—	—	8	20	12	30	20	50
1989-90	—	—	8	10	12	15	20	25
Total	5	25	176	830	259	1220	440	2075

8.9 SUBSIDY TOWARDS THE COST OF CHEMICAL :

8.9.1 Potassium Iodate, the chemical used for the manufacture of iodised salt, is presently obtained by importing Crude Iodine and getting it converted into Potassium Iodate through a private chemical manufacturing firm in Bombay. While earlier iodine was imported through the State Chemicals & Pharamaceuticals Corpn., it having now been placed on OGL., M|s. Hindustan Salts Limited (A Government of India Undertaking) imports iodine directly and gets it converted into KIO_3, keeping in view the requirements of the iodisation plants installed in the Public Sector at Kharaghoda, Sambhar Lake and Howrah.

8.9.2 The procedure followed by M|s. Hindustan Salts Limited cannot be adopted by the numerous parties in the private sector who would be needing KIO_3 in future. Further, unless a centralised agency is created for the purpose of import of iodine, getting it converted into KIO_3 and supply to the various iodisation plants, it would not be possible to maintain a uniform price and quality. Such handling of these functions by a centralised agency would also avoid wastage. The Study Group recommends that the Salt Commissioner be entrusted with this job.

8.9.3. The Study Group understands that the present cost of Potassium Iodate is about Rs. 240|- per kg. and that the imported Iodine is liable for the levy of Customs Duty. For want of an indigenous source of iodine, its import is essential for combating goitre. The Study Group strongly urges the Government to exempt imported iodine from the levy of Customs Duty. If this recommendation is accepted by the Government, the cost of KIO_3, the Study Group feels, could be maintained at a reasonable level, particularly when large quantities are going to be required for implementation of the National Goitre Control Programme, in future.

8.9.4. Similarly, apart from M|s. Electromet Corporation, Bombay which is presently converting Crude Iodine into KIO_3 for M|s. Hindustan Salts Limited, many new firms might come forward to do the job when the demand for KIO_3 increases, thereby offering competitive charges for conversion. (A list of known Potassium Iodate suppliers appears at *Annexure—XVII*).

8.9.5. Further, the Study Group understands that the Ministry of Health and Family Welfare are contemplating revision of the existing levels of iodisation to 40 ppm (iodine) at the production end and 15 ppm (iodine) at the retail|consumption and to take care of the losses in handling and transit.

8.9.6 Keeping in view the above consideration, the Study Group estimates the outlay on subsidy towards the cost of the iodine chemical as under :—

Year	Qty. of salt to be iodised (lakh tonnes)	Qty. of KIO_3 required (tonnes)	Subsidy on account of the cost of KIO_3 @Rs. 240/- per kg. (Rs. in lakhs)
1985-86 .	10	66.7	160
1986-87 .	20	133.4	320
1987-88 .	30	200.1	480
1988-89 .	40	266.8	640
1989-90 .	50	333.5	800
		Total	2400

8.9.7. The Study Group recommends that all iodisation plants, irrespective of whether they are set up in the public sector or private sector, be supplied KIO_3 free of cost till 1990.

8.10. OPERATIONAL COST :

8.10.1. Even though the Government may provide indisation plants and Potassium Iodate free of cost, the Study Group apprehends that the response from the small and medium-scale salt manufacturers (Category-II, III & IV) will be poor unless the Government subsidises the additional cost involved in operating the iodisation plants.

8.10.2. As per the data made available to the Study Group by the Salt Commissioner, it has been observed that the Operational Cost. viz. labour, power etc. by the spray process averages at Rs. 12 per tonne in the public sector undertakings (Annexure—XVIII). As no iodisation unit had come into being in the private sector when the Study Group had met, it has not been possible for the Study Group to examine the possible cost of iodisation in the private sector. However, the Study Group was satisfied that, for the time being, the rate of Rs. 12|- per tonne could be reckoned for private sector also.

8.10.3 In view of the necessity to afford financial assistance to the small and medium-scale salt manufacturers (Category-II, III & IV) in the private sector towards the operational cost, the Study Group recommends that these categories in the private sector be reimbursed the operational cost @ Rs. 12|- per tonne. However, the Study Group feels that similar assistance need not be extended to the large-scale salt manufacturers (Category-I) and they could absorb the additional cost within the system.

8.10.4. The total outlay on account of the reimbursement of the operational cost is estimated as under :—

Year	Total Qty. of salt to be iodised (lakh tonnes)	Total Qty. expected from the small & medium-scale manufacturers (Cat. II, III & IV) (lakh tonnes)	Subsidy @ Rs. 12/- per tonne. (Rs. in lakhs)
1985-86	10	6.0	72
1986-87	20	12.0	144
1987-88	30	18.0	216
1988-89	40	24.0	288
1989-90	50	30.0	360
Total			1080

8.10.5. Iodisation Plants already established in places other than salt producing centres and plants that may be set up in such locations in future will not be eligible for the subsidy on operational cost.

8.11.0. PACKING :

8.11.1. Common salt is marketed in either the Crystal or Crushed form, in units of 75 kg. and 100 kg. packings. Similarly, iodised salt is also at present marketed in 75 kg. and 100 kg. units packages. On account of the low cost of the commodity and the higher cost of the jute bags, the salt trade is inclined, more often than not, to choose once-used jute bags for packing and despatch of salt. For even when new bags are used, they get soon unfit for reuse due to the use of steel hooks, by the labour handling the bags. Further, damage is also caused during transport in open wagons by the Railways, loading and unloading, storage etc. certain enterprising salt manufacturers, however, use polythene jute bags or HDPE bags with an eye on the quality of their product.

8.11.2. The question whether any alternate and improved method of packing should be prescribed for iodised salt was discussed by the Study Group at length, keeping particularly in view the fact that the packing material should be such as not only to withstand the stresses and strains of handling and transport but also protect the iodised salt from being stripped of it iodine content. In the absence of any systematic study on the packing material, the Study Group recommends that the Indian Institute of Packaging, Bombay may be requested to undertake a study of iodised salt with different packing materials from the points of view of durability, economy and protecting the contents and the cost of such study be met from the cess proceeds.

8.11.3. In so far as granting of any subsidy towards the cost of packing material—either at the manufacturing level or retail level—the Study Group does not desire to recommend any subsidy until the results of the proposed study are available. Till then the existing trade practice may continue .

8.12 SUMMARY :

8.12.1 The total outlay on the various subsidies and other kinds of financial assistance recommended by the Study Group is summarised as under :—

	(Rs. in lakhs)
Plant & Machinery	
(i) Cost of Demonstration Units/Extension Centres to be set up by the Salt Department .	25
(ii) Loans to major salt manufacturers for installation of plants.	830
(iii) Subsidy to small and medium scale salt manufacturers for installation of plants .	120
	2075
Chemical	
(iv) Cost of chemical to be met in full by the Government till 1990 .	2400
Operational cost of plants	
(v) Subsidy to small & medium scale salt manufacturers towards the operation cost .	1080
	5555

8.13 A detailed statement showing the various components of the outlay during the 7th Five Year Plan is annexed. (*Annexure—XIX*).

8.14 STRENGTHENING OF SALT DEPARTMENT :

8.14.1 It will be observed that the Study Group has favoured the Salt Department of the Government of India as the agency best suited for undertaking the responsibility for a successful implementation of the Government's decision to iodise the entire edible salt by 1990. The DGHS will however continue to supervise the entire programme, carry out periodical surveys to determine the effects of supply of iodised salt, maintain a close liaison between the Salt Commissioner and the State Governments. However, the Salt Commissioner's Organisation needs to be adequately strengthened to handle the following jobs :—

1. Licensing new Units,
2. Monitoring the production & distribution,
3. Quality Control and direction,
4. Establishment of Demonstration Plants Extension Centres,
5. Affording technical guidance,
6. Import of iodine and distribution of Potassium Iodate,
7. Disbursement of loans and subsidy, and
8. Maintenance of Statistics.

8.14.2. The requirements of the necessary infrastructure for discharging the above responsibility may be worked out by the Salt Commissioner for inclusion of the expenditure to the 7th Five Year Plan.

CHAPTER—IX

SUMMARY OF RECOMMENDATIONS

9.0 COMPLETE IODISATION BY 1990:

9.1 Keeping in view the threat posed by Goitre and iodine deficiency disorders to public health, the entire edible salt in the country should be iodised by 1990.

9.2 To achieve the aim of iodising entire edible salt by 1990, it shall be made mandatory on the part of the salt manufacturers to produce and offer only iodised salt for human consumption after 1990 and with this objective in view the Government may consider amending the provisions of the Central Excise and salt Act, 1944 and the Rules made thereunder, the Salt Cess Act 1953 and the Rules made thereunder and the conditions of licence for salt manufacture. Similarly, suitable amendments may be made in the provisions of the PFA Act, 1954 and the Rules made thereunder permitting the sale of only iodised salt for human consumption after 1990.

9.3. The levels of iodine at the manufacturing stage and the consuming end should provide a suitable range to take care of loss of iodine in transit and handling. However, the amendments being contemplated by the Ministry of Health & Family Welfare to the provisions of the PFA Act, 1954 where by the levels of iodine at the manufacturing and consuming ends are proposed to be fixed at 40 ppm and 15 ppm, respectively will be adequate.

9.4 COMPONENTS AFFECTING COST OF PRODUCTION OF IODISED SALT :

9.4.1. *The components which have a direct bearing on the cost of production of iodised salt are* :—

(i) Plant & Machinery ;

(ii) Chemical ;

(iii) Operational cost (Labour) ; and

(iv) Packing.

(1) Plant & Machinery.

(a) Spray-mixing process.

(i) Plant and machinery costing about Rs. 4 lakhs including accessories and installation charges, for a spray-mixing type of unit of 10000 tpa (on single-shift basis).

(ii) Crusher|Grinder :

Crusher|Grinder of 5 tpa capacity costing about Rs. 1 lakh for reducing the particle size for effective iodisation to be attached to each spray-mixing unit.

(b) Submersion process.

Cost of civil works and pump set at Rs. 20,000 for a plant with a capacity of 5,000 tpa.

(2) Chemical

Potassium Iodate and Calcium Iodate are the two Iodine compounds which are used in India for iodisation of salt. The spray-mixing units make use of Potassium Iodate, while Calcium Iodate is used in the Submersion process. A majority of the units in the Private Sector are expected to adopt the Spray-mixing process and the cost of Potassium Iodate, is reported to be Rs. 240|- per kg. at present.

(3) Operational cost.

Operational cost for manufacture of iodised salt including labour, electricity, spare parts and maintenance of the plants works out @ Rs. 12|- per tonne for Spray-mixing plant.

(4) Packing.

Use of alternate packing material both at the manufacturing level and the consuming end.

9.5 INCENTIVES :

9.5.1. With a view to encouraging the salt manufacturer to produce iodised salt, suitable assistance in the initial stage, in the form of loans and subsidy should be given by the Government to the Private Sector.

9.6 LOANS & SUBSIDY FOR PLANT AND MACHINERY :

9.6.1. Large-scale salt manufacturers (Category-I) may be granted soft loans repayable in 10 equal annual instalments, subject to a maximum of Rs. 5 lakhs for establishing an integrated Spray-mixing type of iodisation plant (10,000 tpa) which includes a Crusher|Grinder.

9.6.2. In so far as small and medium-scale salt manufacturers (Category-II, III & IV) including non-licensed manufacturers and Co-operative Societies are concerned, full financial assistance, in the form of subsidy may be granted to enable them procure and instal iodisation plants. Such manufacturers may, however, be encouraged to form associations| co-operatives for effective implementation of the programme.

9.6.3. With a view to seeing that as many number of iodisation plants are set up as quickly as possible and to attract the Private Sector the assistance recommended above may be made available in full (100 per cent) for plant that may be set up on or before 31-3-1988; 50 per cent in respect of plants set up between 1-4-1988 and 31-3-1989 and 25 per cent in respect of plants set up between 1-4-1989 and 31st March, 1990.

9.6.4. The Salt Commissioner may take necessary action in getting the terms & conditions framed for the grant of loans and subsidy.

9.6.5. No loan or subsidy towards plant and machinary need be granted beyond 31-3-1990.

9.7. COST OF CHEMICAL :

9.7.1. The entire cost of Potassium Iodate|Calcium Iodate should be subsidised upto 1990, either by reimbursement of its cost or by supply of the chemical free of cost to all cattgories of iodised salt manufacturers. The Salt Commissioner may undertake the responsibility of disbursing subsidy, by framing the necessary procedures.

9.7.2. The Government of India may consider exempting imported iodine, required for the implementation of the National Goitre Control Programme, from the levy of Customs Duty.

9.8. OPERATIONAL COST : (LABOUR)

9.8.1. There is no need to subsidise cost incurred by Category-I salt manufacturers towards the operational cost. But in the case of plants set up by Category-II, III & IV salt manufacturers (including non-licensed sector and co-operative societies) the operational cost (running and maintenance) may be reimbursed in full upto 1990 @ Rs. 12|- per tonne.

9.8.2. The disbursement of subsidy towards operational cost of iodisation should be based on proof of production and despatch of iodised salt of approved quality on the basis of certificates issued by the field officers of Salt Commissioner's Organisation.

9.8.3. In so far as iodisation plants set up by parties other than salt manufacturers, at salt producing centres, they may be treated on par with Category-I salt manufacturers for purpose of granting loans and subsidy.

9.9. COST OF PACKING :

9.9.1. Until the question of prescribing a uniform system of packaging is examined, the existing system of packing may continue for iodised salt and there is no need to grant any subsidy to any categories of producers towards any additional expenses for packing iodised salt.

9.9.2. The Iodised salt packages should bear a legend indicating the name of the manufacturer, month of iodisation, level of iodine content and a clear indication that the contents are "Iodised Salt".

9.9.3. The Indian Institute of Packaging, Bombay be requested to undertake a study on the material for packing iodised salt from the points of view of the durability and economy of the packing material and the cost of the study may be met from the Salt Cess Proceeds.

9.10. ASSISTANCE FOR PLANTS ALREADY SET UP :

9.10.1. In respect of iodisation plants that have been already set up, only chemical to be supplied to them free of cost. However in such plants are put up by Category-II, III & IV salt manufacturers, reimbursement of the operational charges may be considered.

9.10.2. No assistance, except supply of chemicals be given to these who might set up plants in future in areas other than salt producing centres.

9.11. SOURCE OF EXPENDITURE ON INCENTIVE :

9.11.1. The entire cost of subsidy and loans needed for implementation of the recommendations during the period 1985-86 to 1989-90 be met by the Ministry of Health and Family Welfare from its 7th Five Year-Plan Budget provisions in the interest of public health.

9.12. AGENCY FOR REGULATION AND CONTROL :

9.12.1. The implementation of the Government's decision to iodise the entire edible salt by 1990 may be entrusted to the Salt Commissioner, Government of India, Jaipur.

9.13. RESPONSIBILITIES OF SALT COMMISSIONER'S ORGANISATION :

9.13.1. The Salt Commissioner's Organisation will monitor the production, distribution and quality of iodised salt.

9.13.2. The Salt Commissioner may import the total quantity of iodine required, get it converted into Potassium Iodate and supply to the various iodisation plants in both the public and private sectors. The Salt Commissioner will make suitable arrangements for handling the receipt, storage and distribution of iodine and potassium iodate.

9.13.3. With a view to promote the installation of iodisation plants, in, particularly, the small and medium-scale sectors, and to afford training facilities and extension services, the Salt Commissioner's Organisation may set up and run a few Demonstration Units at selected centres in each state where there is a concentration of small scale salt manufacturer. Such plants may be run by Salt Commissioner for 3 to 5 years and thereafter hand over the plants to the Co-operatives' Associations of the salt manufacturers for future running and maintenance.

9.13.4. The Salt Commissioner's Organisation will also afford technical guidance for installation and running of plants and other promotional activities.

9.13.5 The Salt Commissioner's Organisation will also maintain a close liaison with the manufacturers of iodised salt, the Ministries of Health and Railways and the State Governments to ensure regular and adequate supplies of iodised salt to the population.

9.13.6. The Salt Commissioner's Organisation will handle the job of processing applications seeking loans, sanctioning and disbursement of loans and effecting recoveries etc. for which necessary rules may be framed.

9.13.7. The job of disbursing subsidy towards the cost of Potassium Iodate|Calcium Iodate and operational costs may be handled by the Salt Commissioner.

9.13.8. To enable the Salt Commissioner to discharge the above responsibilities, the Salt Commissioner's Organisation may be strengthened with necessary infrastructure.

9.14. I.S.I. CERTIFICATION

9.14.1 ISI certification for iodised salt may be voluntary till 1990 and may be made compulsory thereafter.

9.14.2. The ISI may be requested to examine the feasibility of charging only a nominal fees for granting its certification to iodised salt.

9.14.3. The Central Food Technological Research Institute, Mysore, National Institute of Nutrition, Hyderabad and Indian Standards Institution, New Delhi may be requested to undertake studies on the shelf-life of iodised salt in field conditions to see whether the optimum level of iodisation at the manufacturing end could be brought down.

सत्यमेव जयते

ANNEXURE I

No. 05015|9|84-Salt
Government of India
Ministry of Industry
(Department of Industrial Development)
New Delhi, the 3rd August, 1984

OFFICE MEMORANDUM

Subject :—Study Group of Cost of production and packing of iodised salt and subsidy required.—

The undersigned is directed to say that in order to boost the production of iodised salt in the country under the National Goitre Control Programme, the Government of India have decided to constitute a Study Group to go into the cost of production and packing of iodised salt and the subsidy required to be given to cover the additional cost involved to the private/co-operative sectors for undertaking commercial manufacture of iodised salt.

2. The composition of the Study Group will be as follows :—

(i) Shri P. Subramanian, Salt Commissioner, Jaipur. —Chairman

(ii) A representative of the Ministry of Health & Family Welfare (Deptt. of Health) —Member

(iii) Dr. P. C. Sen, Adviser (Nutrition) D.G.H.S., New Delhi. —Member

(iv) A representative of Ministry of Chemicals & Fertilizers (Deptt. of Chemicals) —Member

(v) A representative of Planning Commission. —Member

(vi) A representative of Ministry of Industry (from Integrated Finance Wing) —Member

(vii) Chairman-cum-Managing Director, M|s. Hindustan Salts Limited, Jaipur. —Member

(viii) Shri F. F. Shroff, Chief Sales Executive, M|s. Tata Chemicals Limited, Bombay House, Bombay. —Member

(ix) Shri M. M. Sand, M|s. Century Chemicals Limited, Jamnagar (Gujarat). —Member

(x) Shri Suresh Khemka, M|s. Lilanand Trading Co. (Pvt.) Ltd., 122, Mahatma Gandhi Road, Calcutta-1. —Member

(xi) Shri M. G. Venkatesh Mannar, Managing Director, M|s. Marthi Crystals Limited, Madras. —Member

3. The Group shall undertake a study of various components of the cost of production of iodised salt conforming to the standards prescribed under the Prevention of Food Adulteration Act and the Rules made thereunder & shall make recommendations in regard to whether, and, if so, what amount of subsidy needed to be given at the stages of production and packing to boost the production of iodised salt to meet in full the requirements of goitre-endemic areas as also regarding modalities of payment of subsidy. The Group shall also study the mode of packing of iodised salt and shall make recommendations regarding suitable material and sizes of packing both at the production & distribution levels.

4. The Group shall submit its report within a period of two months.

5. Every non-official member of the Group attending a meeting of the Group & its Sub-committee, if any, shall be entitled to TA & DA as admissible to grade I officers of Government of India under the Rules & Orders issued by Government from time to time. Salt Commissioner, Jaipur will be the Controlling Officer for the purpose of counter-signing the TA & DA bills of the non-officials.

Sd|-
(O. P. Sharma)
Under Secretary to the Govt. of India
Tele : 374765

ANNEXURE II

No. 05015|9|84-Salt
Government of India
Ministry of Industry
(Department of Industrial Development)
New Delhi, the 31st August, 1984

OFFICE MEMORANDUM

Subject : Study Group on Cost of production & packing of iodised salt and subsidy required.

The undersigned is directed to refer to this Ministry's Office Memorandum of even number dated 3-8-1984 on the above subject (copy enclosed) and to say that the Government of India have decided to nominate the following persons more on the Study Group :—

(1) Shri D. S. Chaddha, ADG (PFA) or Smt. Debi Mukherjee, Asstt. Secretary, (PFA) DGHS.

(2) Director National Institute of Nutrition, Hyderabad.

(3) A representative of the Bureau of Industrial Costs & Prices.

Sd|
(R. M. KANSAL)
Under Secretary to the Govt. of India
Tele : 376750

ANNEXURE III

MINUTES OF THE MEETING OF STUDY GROUP ON IODISED SALT HELD AT JAIPUR ON 21ST & 22ND SEPTEMBER, 1984

1.0 Welcoming the members, the Chairman highlighted the problem of goitre in India and also the efforts so far made by the Government of India for its eradication. In his inaugural speech, he pointed out that the iodine deficiency disorders had, of late, assumed great significance in view of the physical and mental retardation they bring about in the affected population. The problem of iodine deficiency had, the Chairman urged, therefore, to be viewed as a public health problem affecting the entire nation. The Chairman also pointed out that the Working Group appointed by the Government on Salt Technology had recommended that the entire edible salt in the country should be iodised by 1990. He briefed the members on the terms of reference of the Study Group.

2.0 The Study Group reviewed the functioning of the National Goitre Control Programme in India and noted with anxiety the prevalence of goitre in almost all the States. Keeping in view the threat posed by goitre and iodine deficiency disorders to public health, the Study Group was unanimous in its opinion that the entire edible salt in the country should be iodised by 1990, by establishing more and more iodisation plants, as the existing units were not enough to meet the challenge.

3.0 The relative merits of establishing iodisation plants in the salt producing centres vis-a-vis the consuming centres were discussed at length. Although the advantage of setting up iodisation plants in the consuming centres could not be lost sight of, the fact that iodisation of salt at the salt producing centres was cheaper and easier, weighed more with the Study Group, promoting it to recommend that in future iodisation plants be set-up preferably, in the salt producing centres.

4.0 Keeping in view the wide disparity existing in the economic status of the salt manufacturing community, the Study Group was of the view that while the Government may have to assist them till 1990, it should be made mandatory on the part of the salt manufacturers to produce only iodised salt for edible purposes after 1990. In view of this, the Study Group recommended that the Government of India may consider amending the provisions of the Central Excise & Salt Act, 1944 and the Rules made thereunder, and the conditions of licence for salt manufacture, so that all the salt manufacturers would be required, to compulsorily iodise the entire quantity of salt produced and offered by them for human consumption. To encourage the salt manufacturers in the initial stages to take up production of iodised salt, suitable assistance in the form of loans and subsidy should be given to them by the Government.

5.0 CAPITAL INVESTMENT :

5.1 The Study Group assessed that 80 per cent of iodised salt production would come from Spray Plants and the remaining 20 per cent by adopting the Submersion process, in view of the fact that the submersion process suffers from certain inherent draw-backs. The Study Group also observed that the Spray Plants could be mounted on wheels and made mobile thereby obviating the necessity of constructing buildings to house the plants. At the most, the Study Group felt, the interested manufacturers may put up semi-permanent structures requiring low investment. After considering the prices quoted by the different indigenous fabricators, the Study Group felt that a Spray Mixing plant with an installed capacity of 5 tonnes per hour and producing 10,000 tonnes per annum on single-shift-basis (i.e. 8 hours per day) should not cost more than Rs. 4 lakhs, including accessories and installation charges.

5.2 The question whether a crusher|grinder should form an integral part of the Spray Mixing plants was discussed at length. It was pointed out that the ISI was proposing a grain size not exceeding 4 mm. for iodised salt i.e., 95 per cent of the iodised salt should pass through 4 mm. I.S. Sieve as against the existing specification which required 99 per cent of the material to pass through 1 mm. I.S. Sieve. As bulk of the Baragara salt produced in the Little Rann of Kutch and elsewhere in Gujarat did not meet these specifications, it would be necessary for the manufacturers to put up crushing|grinding units to reduce the particle size (keeping also in view the established consumer preference). Such a reduction in grain size also aids in the proper dispersal of the iodising agent in the salt. The Study Group, therefore, recommended that a crushing|grinding unit should be considered as an integral part of an iodisation plant. A crusher|grinder working at 5 tonnes per hour was found to cost about Rs. 1 lakh. Thus, the total capital investment for setting up a Spray Mixing unit (10,000 TPA on single shift-basis) was estimated at Rs. 5 lakhs and this figure was adopted by the Study Group for purposes of considering the grant of financial assistance.

6.0 RUNNING AND MAINTENANCE OF THE PLANTS :

6.1 The Study Group considered the figures of the cost of iodisation obtaining at the 3 public sector units at Howrah, Kharaghoda and Sambhar Lake during 1983-84. The experience of M|s. Tata Chemicals who had already gone into production of iodised salt in the private sector was also considered by the Study Group. After discussing the various components which go into making up the cost of running and maintenance of the Spray Mixing plant, the Study Group was of the opinion that the operational cost should be of the order of about Rs. 12|- per tonne, excluding the cost of iodine compound, based on the present day costs. The Study Group's observation whether this cost of production could be further studied by he BICP, New Delhi has not been agreed by the Bureau in view of the fact that "while the Study Group had not recommended any subsidy to plants put up by Category-I salt manufacturers. The cost incurred by the existing Public Sector Units with the attendant economies of scale may not be representative in respect of an Iodisation plant of a much smaller capacity of 10,000 TPA being recommended for the units coming up in the small and medium scale sector". As there were no units at present operating in these sectors, the BICP opined that the subsidy payable to these categories of manufacturers may be determined based on the available cost i.e. Rs. 12|- per tonne.

7.0 COST OF IODINE COMPOUND

7.1 As there is no indigenous source of iodine, it is presently imported and got converted into Potassium Iodate. In order to ensure that adequate supply of Potassium Iodate is made available to all the iodisation plants both in the public as well as in the private sector, the Study Group recommended that the Salt Commissioner's Organisation may import the total quantity of iodine required by iodisation plants both in the public and private sectors and get it converted into Potassium Iodate.

7.2 In this connection, the Study Group also recommended that the Government of India may be requested to consider exempting iodine required for the implementation of the National Goitre Control Programme from the levy of Customs Duty. As the handling of iodine, getting it converted into Potassium Iodate and supplying it to the various iodisation plants (keeping a proper inventory of both iodine and Potassium Iodate etc.) involved a heavy responsibility, the Salt Commissioner's Organisation, the Study Group recommended, should be adequately strengthened. While the present cost of Potassium Iodate was reported to be about Rs. 240|- per Kg., the Study Group felt that when a number of new plants go into production and the total requirements increase, the cost of Potassium Iodate was likely to stabilise around he existing price. Exemption of imported iodine from the levy of Customs duty, if approved by the Government, would further help in holding the price of Potassium Iodate.

8.0 Having considered the various components that go into the establishment of an iodisation plant and keeping in view the urgency of iodising the entire edible salt by 1990, the Study Group was of the opinion that unless some incentives were made available to the salt manufacturers, it may not be possible to achieve the target. However, the Study Group felt that the large scale salt manufacturers who were better placed financially have also social obligations to fulfil. As such, the Study Group recommended as under :—

8.1 Large scale salt manufacturers (holding more than 100 acres) may be given soft loans with nominal rate of interest to cover service charges repayable in 10 equal annual instalments subject to a maximum of Rs. 5 lakhs for an integrated Spray Mixing type of plant of an installed capacity of 10,000 tonnes per annum working on single shift. Suitable safeguards, the Study Group observed, could be provided to ensure that the parties availing this facility actually go into production and manufacture the required quantity of iodised salt.

8.2 Keeping in view the financial weakness of the small (each holding upto 10 acres under salt manufacture) and medium-scale salt manufacturers (each holding between 10-100 acres under salt manufacture) including the non-licensed and co-operative sectors, the Study Group recommended that these categories of manufacturers may be granted full financial assistance in the form of subsidy to procure and install iodisation plants. They may, however, be encouraged to form into co-operative ventures or Associations.

8.3 With a view to enthuse the salt manufacturers into coming forward to avail these incentives quickly, the Study Group recommended the following phased programme :

8.3.1 Those who procure and install iodisation plants on or before 31-3-1988, may be given full assistance (loans|subsidy) towards capital cost of the plants and machinery and the cost of installation, subject to a maximum limit of Rs. 5 lakhs per plant of 10,000 TPA capacity, in the case of Spray Mixing plant and Rs. 20,000 for a plant of 6,000 tonnes per annum capacity using the submersion process.

8.3.2 Those who install iodisation plants between 1-4-1988 and 31-3-1989 would be entitled only to 50 per cent of the above facilities and during 1-4-89 to 31-3-1990 to only 25 per cent.

8.3.3 No incentives will be available from 1-4-90 onwards.

8.4 The Study Group also recommended establishment of extension centres-cum-demonstration units by the Salt Department of the Ministry of Industry, Government of India at selected centres in each State where there was a concentration of small and medium-scale manufacturers (including non-licensed and co-operative sectors) in order to provide extension services and training facilities. Such extension centres may be worked by the Salt Commissioner's Organisation for a period of 3 to 5 years, within which time the Salt Department may promote the formation of Co-operative ventures or Associations by the above said category of manufacturers and also provide training facilities and ultimately hand over the plants to such bodies for further running and maintenance. Only Spray type of units may be installed at these centres.

9.0 Considering the operational aspects and the cost of running and maintenance of the plants already set-up and those proposed to be set-up in future, the

Study Group recommended that the entire cost of Potassium Iodate required for iodisation of salt for edible purpose should be subsidised in full either by reimbursement of its cost (in respect of plants that have already gone into production) or by supply of Potassium Iodate free of cost to all categories of producers of iodised salt until 1990.

10.0 The Study Group felt that there was no need to subsidise any part of the operational cost of the iodisation plants i.e., labour, power etc., installed by Category-I salt manufacturers (each with more than 100 acres for salt manufacture) but in the case of small and medium-scale manufacturers, including those in the non-licensed and co-operative sector, the Study Group recommended that the operational cost be reimbursed in full upto 31-3-1990 at Rs. 12|- per tonne of iodised salt produced. The above categories of salt manufacturers may be encouraged to form into co-operative ventures or associations for setting up of iodisation plants.

11.0 The Study Group also recommended that in view of its earlier recommendation that iodisation plants should be established preferably in salt producing centres, no loan or subsidy, other than the free supply of the iodine compound, need be made available for the plants already installed in the non-salt producing centres, and for those plants that may hereinafter be located in non-salt producing centres.

12.0 PACKING OF IODISED SALT

Presently common salt is marketed by the Salt Manufacturers in Jute bags or Polylined Jute Bags of HDPE bags, in units of 75 kgs., and 100 kgs. In view of the low cost of salt, there is a tendency to prefer second hand gunny bags, particularly for packing crystal salt. In so far as crushed salt is concerned, it is normally packed in poythene-lined jute bags or HDPE bags to avoid losses during transit. Crushed salt, particularly of the Kurkutch variety is being packed in poly-woven or poythene-lined bags to avoid discoloration and contamination with jute fibre. Keeping these practices in view, the Study Group recommended that there was no immediate necessity to deviate from the existing trade practices as it would otherwise cause a great dislocation and result in a heavy financial liability, if iodised salt were to be packed compulsorily in polythene-lined bags or HDPE bags of 50 kg., units. It was, however, understood that the salt manufacturers will automatically switch over to 50 kg. unit of packing when the recommendations of the ILO convention, to which India is a signatory, are uniformly enforced for all commodities. The Study Group, therefore, recommended that the existing system of packing may continue and no radical change need be considered at this stage and that there was no immediate need to consider granting any subsidy to any category of producers of iodised salt for packing. The iodised salt packages shall, however, bear a detailed legend indicating the name of the manufacturer, month of iodisation, level of iodine content and a clear indication that the contents are "IODISED SALT".

13.0 QUALITY CONTROL

13.1 The Study Group laid stress on the quality control aspect, since a successful implementation of the Goitre Control Programme depends, among other things, on a strict quality control on the iodised salt. Unless the iodised salt contained the prescribed minimum level of iodine when it reaches the consumer, the entire Goitre Control Programme would prove ineffective.

13.2 The apprehensions of the iodised salt manufacturers in the private sector about the threat of prosecution in the event of non-conformity of the samples drawn at the retail level to the PFA standards was considered by the Study Group, which recommended that in the interest of the programme, it was necessary to fix the minimum iodine content both at the manufacturing and retail stages. Keeping in view factors such as the likely loss of iodine during the interregnum from the date of iodisation to the date of retail sale|consumption (which may not be more than a year), the use of gunny bags as containers (with a view to minimising the cost of packing), exposure of the packages to weather during transport by rail|road and in view of the fact that the incidence of the cost of iodine compound in the unit cost of iodised salt is too small, the Study Group recommended that the level of iodine in salt at the manufacturing stage, while being within the permissible health limits, should provide a margin to take care of possible losses. As the Ministry of Health and Family Welfare were considering to fix the level of iodine in salt at the manufacturing stage to be not less than 40 ppm. and that at the retail stage to be not less than 15 ppm. thereby providing a range of 25 ppm. to cover the likely loss of iodine during the interregnum between the manufacturing stage and the retail sale|consumption, the Study Group opined that this wide range was adequate.

13.3 The Study Group, however, recommended that the CFTRI, Mysore, the NIN, Hyderabad and the ISI, New Delhi may be requested to undertake studies on the shelf-life of iodised salt under field conditions to see whether the optimum level of iodisation at the manufacturing stage could be brought down.

13.4 The Study Group recommended that the Ministry of Health and Family Welfare may be requested to advise the State Governments|Union Territory administrations that, while they may continue to take measures to enforce quality control on iodised salt under the provisions of the PFA Act| Rules, no undue harassment is caused to any of the manufacturers|dealers|retailers of iodised salt.

13.5 Considering the desirability of insisting on compulsory ISI certification of iodised salt, the Study Group recommended that in view of the heavy charges involved, the ISI certification may be made voluntary till 1990 and thereafter compulsory. The Study Group also recommended that the ISI may be requested to examine the feasibility of charging only a nominal fees for granting ISI certificate so that the iodised salt manufacturers would voluntarily adopt the certification.

13.6 The Study Group also desired that a portable analytical kit similar to the one developed in Indonesia for spot testing of iodised salt should be developed to suit Indian conditions. Till the ISI certification becomes compulsory, there should be an agency to monitor the quality of iodised salt produced in the private sector to ensure that the iodised salt contains the prescribed level of iodine at the manufacturing level. The Salt Commissioner's Organisation was identified as the suitable agency to monitor quality, by establishing additional laboratories at suitable Centres.

14. OTHER ASPECTS

14.1 Agency for handling and disbursement of Subsidy etc.

After a great deal of deliberation, the Study Group identified the Salt Department as the agency best suited for monitoring the production and distribution of iodised salt and disbursement of subsidy and loans to various categories of salt manufacturers. However, as the Salt Department did not possess adequate man-power and means of transport to undertake this additional responsibility at present, the Study Group recommended the strengthening of the Salt Organisation at various levels, both in the Headquarters at Jaipur and also in the field. A separate Goitre Cell to monitor the implementation of the various recommendations should also be created in the Salt Department's Headquarters Office and its Regional Offices. A cadre of Officers may be created to handle extension services etc.

14.2 The Study Group also recommended that the Salt Department should be entrusted with the task of importing iodine, its conversion to Potassium Iodate and distribution of the chemical to all the iodised salt manufacturers in the country. In order to handle this additional responsibility, Salt Commissioner's Organisation should be adequately strengthened.

15.0 The Study Group further recommended that the disbursement of subsidy towards the cost of production of iodised salt should be based on the proof of production of iodised salt of approved quality and its despatch.

15.1 To avail the benefit of reimbursement of subsidy, the manufacturers of iodised salt entitled for such subsidy should obtain and produce certificates from the field Officers of the Salt Commissioner's Organisation as to the bonafides of the quality of iodised salt produced and despatched. If need be, the Salt Commissioner's Organisation should be adequately strengthened, as this job involves a great responsibility on the Salt Commissioner.

16.0 The Study Group also recommended that the entire cost of subsidy and loan towards the programme of increasing the production of iodised salt in the country from 1985 to 1990 may be included in the Seventh Five Year Plan of the Ministry of Health and Family Welfare.

17.0 The meeting concluded with a vote of thanks to the Chair.

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ANNEXURE—IV

Statement showing the methods adopted in some of the foreign countries for combating endemic Goitre and Iodine Deficiency Disorders.

Sl. No.	Name of the country	Medium of supply of iodine	Whether iodisation is voluntary or Statutory	Level of iodine (mg/Kg. Salt)	Iodine Compound used
1	2	3	4	5	6
	America				
1.	Argentina	Salt	Statutory	33	KI&KIO$_3$
2.	Brazil	Salt	-do-	20	KIO$_3$
3.	Costa Rica	Salt	-do-	33–66	KIO$_3$
4.	USA	Salt	Voluntary	100	KI
	Europe				
1.	Czechoslovakia	Salt	Statutory	25	KI
2.	Italy	Salt	-do-	20	KI
3.	Poland	Salt	-do-	12	—
	Asia				
1.	Afghanistan	No programme implemented yet	—	—	—
2.	Bangla Desh		—	—	—
3.	Burma	Salt	Statutory	60-80	KIO$_3$
4.	Taiwan	Salt	-do-	30	KIO$_3$
5.	Indonesia	Salt	-do-	40	KIO$_3$
6.	Japan	No goitre			
7.	Nepal	Salt	-do-	40	KIO$_3$
8.	Thailand	Salt	-do-	50	KIO$_3$
	Africa				
1.	Ethiopia	Iodinated Food	-do-	23 Food	—
2.	Kenya	Salt	-do-	20	KI
3.	Sudan	Iodine Tablets	—	—	KI
4.	Zaire	Iodinated Oil	—	—	—

Source: *The Control of Endemic Goitre*, De Maeyer, E.M. et al., Geneva (1979) World Health Organisation, pp. 53-71.

ANNEXURE-V

Statement showing the installed capacities of the Iodisation Plants in the Public Sector.

Sl. No.	Location	Number of Plants		Insatlled Capacity (tonnes/hour)			Annual Production Capacity (on double-shift basis) '000 tonnes.			Total installed capacity ('000 tonnes/year)
		Dry mixing	Spray mixing	Dry mixing	Spray mixing	Pilot mixing	Dry mixing	Spray mixing	Pilot plant	
1.	Sambhar Lake . . . . . (M/s. Sambhar Salts Limited)	2	3+1@	7	8	Nominal	67.2	115.2	3.0	185.4
2.	Kharaghoda . . . . (M/s. Hindustan Salts Limited)	—	3	—	8	—	—	115.2	—	115.2
3.	Howrah . . . . . (Salt Commissioner)	—	3+1@	—	5	3	—	67.5	13.5	81.0
	Total	2	9+2@	7	21	3	67.2	297.9	16.5	381.6

@Pilot Plants

Note: Annual production capacities at Kharaghoda and Sambhar Lake are based on 300 working days and 8 hours per shift. At Howrah the duration of a shift is 7½ hours.

(Source : *Salt Commissioner, Jaipur*)

ANNEXURE-VI

Goitre endemic areas fed by Iodisation Plants in the Public Sector
(as on 1-1-1984)

Sl. No.	Name of the State	Annual Requirements of Iodised salt to be met from (Quantity in '000 tonnes)				Name of the districts
		Sambhar lake	Kharaghoda	Howrah	Total	
1.	Jammu & Kashmir	21.60	16.10	—	37.70	Whole State
2.	Himachal Pradesh	—	26.70	—	26.70	Whole State.
3.	Uttar Pradesh (9 Distts)	31.90@	20.90*	—	52.80	*Dehradun and Bijnor @Uttar Kashi, Chamoli, Almora, Garhwal, Tehri Garhwal, Pithoragarh and Nainital.
4.	Bihar (1 distt.)	—	34.40**	—	34.40	** Champaran only,
5.	West Bengal (5 Distts)	—	—	59.80	59.80	Darjeeling, Jalpaigudi, Malda, West Dinajpur and Coochbehar.
6.	Maharashtra (1 Distt.)	—	9.30	—	9.30	Aurangabad
7.	Madhya Pradesh (4 Distts.)	—	41.62	—	41.62	Raigarh, Sahdol, Sidhi, Surgaja
8.	Delhi	2.00	—	—	2.00	Delhi.
9.	Haryana (1 District)	9.70	—	—	9.70	Ambala.
10.	Punjab (3 Districts)	24.00	—	—	24.00	Gurudaspur, Hoshiarpur & Ropar
11.	Chandigarh	3.00	—	—	3.00	Chandigarh.
12.	Manipur	12.70	—	—	12.70	entire State.
13.	Nagaland	6.70	—	—	6.70	entire State.
14.	Arunachal Pradesh	5.30	—	—	5.30	entire State.
15.	Gujarat (1 District)	—	8.40	—	8.40	Bharuch.
16.	Defence Depots.	0.34	4.20	—	4.54	entire State.
17.	Sikkim	—	—	2.60	2.60	Whole State.
	Total	117.24	161.62	62.40	341.26	

(Source : *Salt Commissioner, Jaipur*)

ANNEXURE-VII

A glimpse into the result of supplying Iodized Salt to some of the Goitre endemic areas

Sl. No.	State/District	Base Survey year (prevalence rate)	Commencement of supply of Iodized Salt	Resurvey year (Prevalence rate)
1.	*Himachal Pradesh*			
	—Sirmor	1959 (45.8%)	1963	1980 (28.6%)
	—Kangra	1958 (41.2%)	1957	1968 (9.9%)
2.	*Punjab*			
	—Gurudaspur	1961 (52.3%)	1964	1969 (42.3%)
	—Hoshiarpur	1961 (40.3%)	1964	1969 (23.6%)
3.	*Uttar Pradesh*			
	—Dehradun	1965 (39.7%)	1966	1969 (16.4%)
	—Uttarkashi	1930 (40.0%)	1966	1974 (25.4%)
4.	Arunachal Pradesh	1960 (38.1%)	1965	1982 (26.1%)
5.	*J&K*			
	—Baramula	1971 (38.2%)	1974	1983 (8.45%)

(Source: *D.G.A.S. New Delhi*)

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ANNEXURE-VIII

Requirement of Iodised salt for additional Goitre endemic areas in the various States

Sl. No.	Name of the State and District				Quantity in '000 tonnes
1.	*Uttar Pradesh*				
	Basti	23.00	Kheri	12.50	165.00
	Deoria	22.00	Pilibhit	6.50	
	Bareilly	14.50	Shahjahanpur	10.50	
	Gorakhpur	24.00	Gonda	18.00	
	Rampur	7.50	Badaun	12.50	
	Bahraich	14.00			
2.	*Bihar*				
	Purnea	22.65	Sitamarhi	12.20	172.50
	Saharsa	18.60	Muzaffarpur	14.85	
	Katihar	9.00	S. Paraganas	23.40	
	Darbhanga	12.65	Ranchi	19.30	
	Madhubhani	14.65	Palamau	12.10	
	Saran	13.10			
3.	*Madhya Pradesh*				
	Sarguja	12.60			
	Sidhi	7.60			
	Sahadol	10.30			41.60
	Raigarh	11.10			
		41.60			
4.	*Andhra Pradesh*				
	Visakhapatnam (Tribal areas)				2.00
5.	*Maharashtra*				
	Amaraoti	12.30			
	Wardha	6.10			
		18.40			18.40
6.	*Kerala*				
	Ernakulam				17.70
7.	*Assam*				
	Whole State				166.10
8.	*Meghalaya*				
	Whole State				6.70
9.	*Tripura*				
	Whole State				17.20
10.	*Mizoram*				
	Whole State				4.00
11.	*Sikkim*				
	Whole state				2.60
12.	*Gujarat*				
	Valsad				10.60
	Total				624.40

(Source: Salt Commissioner, Jaipur & DGHS, New Delhi)

ANNEXURE-IX

Statement showing the number of units permitted to manufacture Iodised Salt as on 30-11-1984 (Both by submersion Process & Spray Mixing Process)

(installed capacity in '000 tonnes)

Sl. No.	Name of the State	Public Sector		Private Sector		Coop. Sector		Total		Remarks
		No. of Units	Installed capacity	No. of Units	Installed capacity	No. of units	Installed capacity	No. of Units	Installed capacity	
1.	Gujarat	...	...	60	1204.0	1	150.0	61	1354.0	
2.	Rajasthan	1	25.0	41	697.5	...	...	42	722.5	
3.	Tamil Nadu	1	15.0	18	417.0	1	10.0	20	442.0	
4.	Andhra Pradesh	...	...	6	101.0	...	...	6	101.0	
5.	Uttar Pradesh	...	...	3	75.0	...	...	3	75.0	
6.	Bihar	...	...	2	60.0	...	...	2	60.0	
7.	Orissa	...	...	2	26.5	...	...	2	26.5	
8.	Maharashtra	...	...	2	22.0	...	...	2	22.0	
9.	West Bengal	...	...	2	37.5	...	...	2	37.5	
10.	Jammu & Kashmir	...	...	2	50.0	...	...	2	50.0	
11.	Assam	...	...	1	25.0	...	...	1	25.0	
12.	Himachal Pradesh	...	...	1	30.0	...	...	1	30.0	
	Total	2	40.0	140	2745.5	2	160.0	144	2945.5	

Note: (1) As on 31-8-84 a total of 139 units were licensed by the Salt Commissioner.

(2) The 144 units mentioned above exclude the Iodisation Plants at Howrah, Kharaghoda and Sambhar.

(3) The Units licensed in the Private Sector include the licensed and non-licensed salt manufacturers and others.

(Source: *Salt Commissioner, Jaipur.*)

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ANNEXURE X

Comparative cost evaluation of Submersion Process & Spray Process (Based on joint study by CSMCRI/HSL/Salt Department), 1982

Description	Submersion Process				Spray Process			
	Man hrs. for 6 tonnes per day	Man hrs. per tonne.	Wage rate per day & per man hr. Rs. Ps.	Amount per tonne Rs. Ps.	Man hrs. for 64 tonnes shift	Man hr. per tonne	Wage Rate Rs. Ps.	Amount per tonne Rs. Ps.
1	2	3	4	5	6	7	8	9
Labour Charges								
(i) Carriage of cut salt from salt stores to unit & dumping (in hopper in case of spray unit & in the submersion tank in case of submersion process)	4.30	...	...	...	56	...	...	...
(ii) Levelling of salt for iodisation	1.00	...	...	...	...	...	...	...
(iii) Charging iodised solution into submersion tank	0.45	...	...	...	...	...	...	...
(iv) Heaping of salt in the submersion tank for draining out the liquid.	3.45	...	...	...	...	...	...	...
(v) Removal of iodised salt from submersion tank to outside stores	6.00	...	...	...	...	...	...	...
(vi) Bagging of salt from the heaps or the unit	6.80	...	...	...	8	...	...	...
(vii) Carriage of filled bags for weighment & stacking	1.50	...	...	...	16	...	...	...
Total Man hrs.	23.50	3.9	Rs. 12/day Rs. 1 50/ man hr.	5.85	80	1.25	Rs. 12/day Rs. 1.50/ man hr.	1.87
(viii) Operator-cum-Electrician	...	...	...	...	8	0.125	Rs. 20/day Rs. 2.50/ man hr.	0.31
Grand Total	23.50	3.9	...	5.85	88	1.38	–	2.18

SCHEDULE

DESCRIPTION	Submersion Process				Spray Process			
	Consumption for 6 tonnes	Rate Rs.	Amount for 6 tonnes. Rs.	Amount per tonne Rs.	Consumption for 64 tonnes. Rs	Rate Rs.	Amount for 64 tonnes. Rs.	Amount per tonne. Rs.
1	2	3	4	5	6	7	8	9
1. Electricity	...	...	...	...	16 units	0.35/unit	5.60	0.09
2. *Depreciation @ 10% for 240 days:*	...	...	1.46	0.24	...	...	...	...
(a) On building & civil works: (value for submersion process Rs. 3,500/- & for Spray Process: Nil)								
(b) On plant machinery @ 10% for 300 days. (Value for submersion process : NIL) (Value for Spray Process: 1.5 lakh)	...	...	...	...	...	...	16.67	0.26
3. *Maintenance* (240/300 *days*):								
(a) On building & Civil Works @3%	...	...	0.44	0.07	...	...	...	...
(b) On Plant & Machinery @ 5%	...	...	...	...	...	...	8.33	0.13
4. Interest @ 18% on capital cost (240/300 days).	...	...	2.62	0.44	...	...	30.00	0.47
5. Cost of labour	...	...	35.10	5.85	...	...	139.52	2.18
TOTAL	...	...	39.62	6.60	...	...	200.12	3.13
Differential increase in the cost of iodisation in submersion process				3.47				

(Source : *Salt Commissioner, Jaipur*.

BASIS FOR CALCULATION OF COST OF IODISATION

1. For comparison purpose, submersion plant of 6 tonnes per day capacity (experimental plant) and spray plant of 192 tonnes per day as rated capacity, has been taken for consideration.

2. The items which are common in both the processes e.g. cutting of salt heap, weighing of salt bags, stacking of bags, cost of chemicals, chemist, attendar, fixed capital on buildings and lands, cost of managerial staff, etc. have not been taken into account.

3. For calculating interest, depreciation and maintenance for spray process, Rs. 1.5 lakhs is taken as cost of plant and interest, depreciation and maintenance is taken in consideration of the working of the plant round the clock for 24 hours and 300 working days; while in the case of submersion method, Rs. 3,500|- is taken as cost of plant (experimental) and 6 tonnes of salt production per 24 hours and 240 working days.

4. Wage for daily wage worker is taken as Rs. 12|- per day.

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ANNEXURE-XI

Statement showing the production of Iodised Salt in the Public and Private Sectors during 1979 to 1984 (upto Nov.)

(in '000 tonnes)

S. No.	Year	Public Sector			Private Sector	Total
		Sambhar Lake	Kharagoda	Howrah		
1.	1979	70.25	101.48	38.02	NIL	209.75
2.	1980	61.90	95.90	42.00	NIL	199.80
3.	1981	84.10	115.30	27.80	NIL	227.20
4.	1982	100.20	90.40	23.20	NIL	213.80
5.	1983	67.29	108.78	27.99	1.64	205.70
6.	1984 (upto Nov.)	57.68	111.65	23.63	17.59	210.55

(Source : *Salt Commissioner, Jaipur.*)

ANNEXURE-XI

Statement showing the supplies of Iodized Salt from the Public & Private Sector Units during 1979 to 1984 .(*Nov.*)

(figures in '000 tonnes)

		1979			1980			1981			1982			1983			1984 (Upto Nov)		
Sl. No.	State to which supplied	Public Sector	Pvt. Sector	Total	Public Sector	Pvt. Sector	Total	Public Sector	Pvt. Sector	Total	Public Sector	Pvt. Sector	Total	Public Sector	Pvt. Sector	Total	Public Sector	Pvt. Sector	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.	J & K	21.8	..	21.8	16.1	..	16.1	22.0	..	22.0	23.3	—	23.3	23.2	0.5	23.7	4.8	1.4	6.2
2.	H.P.	9.5	..	9.5	14.6	..	14.6	9.1	..	9.1	6.7	..	6.7	9.3	0.1	9.4	7.9	0.5	8.4
3.	U.P.	24.8	..	24.8	23.3	..	23.3	31.5	..	31.5	25.6	..	25.6	28.6	0.1	28.7	28.0	1.1	29.1
4.	Bihar	11.3	..	11.3	13.3	..	13.3	16.5	..	16.5	13.1	..	13.1	13.4	..	13.4	19.9	..	19.9
5.	West Bengal	28.1	..	28.1	34.5	..	34.5	27.2	..	27.2	25.6	..	25.6	31.4	..	31.4	27.1	0.7	27.8
6.	Assam	..	..	..	..	..	..	..	..	..	..	..	..	1.9	..	1.9	..	..	..
7.	Arunachal	1.3	..	1.3	2.6	..	2.6	2.3	..	2.3	1.4	..	1.4	1.8	..	1.8	2.1	0.1	2.1
8.	Manipur	6.2	..	6.2	8.0	..	8.0	8.5	..	8.5	6.5	..	6.5	6.7	..	6.7	2.9	1.3	4.2
9.	Nagaland	2.4	..	2.4	5.4	..	5.4	3.9	..	3.9	2.1	..	2.1	2.3	..	2.3	0.4	1.0	1.4
10.	Sikkim	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0.6	..	0.6
11.	M.P.	..	..	..	..	..	..	..	..	..	..	..	..	0.6	..	0.6	8.3	..	8.3
12.	Maharashtra	..	..	..	..	..	..	..	..	..	0.8	..	0.8	5.1	..	5.1	5.4	0.2	5.6
13.	Haryana	4.9	..	4.9	2.9	..	2.9	5.1	..	5.1	5.3	..	5.3	4.4	0.1	4.5	5.1	1.3	6.4
14.	Punjab	5.1	..	5.1	3.2	..	3.2	4.2	..	4.2	3.4	..	3.4	3.5	0.3	3.8	2.2	3.0	5.2
15.	Chandigarh	1.9	..	1.9	1.4	..	1.4	1.9	..	1.9	1.7	..	1.7	1.2	0.1	1.3	1.8	2.0	2.0
16.	Delhi	..	..	..	..	..	..	..	..	..	..	..	..	..	0.4	0.4	..	6.3	6.3
17.	Gujarat	..	..	..	..	..	..	..	..	..	1.2	..	1.2	2.0	..	2.0	2.8	0.4	2.84
18.	Mizoram	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0.7	..	0.7
19.	Defence	2.4	..	2.4	1.9	..	1.9	3.8	..	3.8	2.7	..	2.7	3.7	..	3.7	3.6	..	3.6
	Total	119.7	..	119.7	127.2	..	127.2	136.0	..	136.0	119.4	..	119.4	139.1	1.6	140.7	123.60	17.14	140.7
	Nepal	87.9	..	87.9	74.1	..	74.1	95.7	..	95.7	94.0	..	94.0	64.8	..	64.8	64.4	..	64.4
	Bhutan	0.1	..	0.1	..	..	..	0.1	..	0.1	..	..	..	..	..	..	0.9	..	0.9
	Total	88.0	..	88.0	74.1	..	74.1	95.8	..	95.8	94.0	..	94.0	64.8	..	64.8	65.3	..	65.3
	Grand Total	207.7	..	207.7	201.3	..	201.3	231.8	..	231.8	213.4	..	213.4	203.9	1.6	205.5	188.9	17.14	205.04

So urce: *Salt Commissioner, Jaipur*)

ANNEXURE—XIII

TERMS & CONDITIONS OF LICENSING PRIVATE SECTOR FOR MANUFACTURE OF IODISED SALT

1. The salt used for iodisation shall be of good quality containing a minimum of 96 per cent Sodium Chloride (on dry basis) and iodised salt produced shall conform to the standards prescribed under the Prevention of Food Adulteration Act, 1954 and the Rules made thereunder. Periodical sampling and analysis of iodised salt manufactured at the plant shall be undertaken by the Salt Department at the Departmental laboratories or any other Government laboratory approved by the Salt Commissioner.

2. Suitable arrangements shall be made to set up a small chemical laboratory for the process control and on the spot analysis of raw salt and iodised salt. Necessary records of analysis as prescribed by the Salt Commissioner or the authorised Officer shall also be maintained. The laboratory will be manned by a qualified chemist having adequate knowledge of chemical analysis.

3. The iodised salt produced shall be sold only in the Goitre endemic areas allotted by the Salt Commissioner. In the case of movement of iodised salt by rail despatches shall be made from the rail head permitted by the Salt Commissioner and indents for wagons for its movement under Category 'B' will be placed after obtaining countersignature on the forwarding notes by the Salt Departmental Officers.

4. The iodised salt to be sold shall be packed in polythene lined jute bags or HDPE bags and the packing shall bear a legend (a) "iodised salt"; (b) name of the producer; (c) date of production and batch No., (d) iodine content and (e) net weight.

5. A weekly statement shall be submitted to the Salt Department in the prescribed form showing (a) the particulars of Potassium iodate|Calcium iodate procured, consumption, quantity held in stock and (b) quantities of iodised salt produced and issued to the Goitre endemic areas attached to the plant and the stocks held at the plant.

6. If it is found at any time that the plant is not able to feed the market attached to it or iodised salt produced at the plant is not of the prescribed standards, the Salt Commissioner has the right to cancel the plant's registration and permit any other iodised salt manufacturer to feed that market.

7. Arrangements shall also be made by the manufacturer himself for procurement of raw salt, Potassium Iodate or Calcium Iodate and for purchase and installation of plant.

8. In case the manufacturer of iodised salt is permitted to adopt the submersion process, the technical knowhow and erection details may be obtained from the National Research Development Corporation, New Delhi|Central Salt and Marine Chemicals Research Institute, Bhavnagar, directly.

9. The manufacturer will ensure and undertake that the iodised salt contains 15 ppm of iodine or such other level of iodisation as may be prescribed by the Ministry of Health and Family Welfare or the Directorate General of Health Services from time to time, when it is offered for sale for human consumption in the Goitre endemic areas.

10. In the case of manufacturer(s) of common salt going into production of iodised salt with the iodisation plant(s) set up in a salt work, all the Rules and Regulations under the Central Excise and Salt Act, 1944 and Rules made thereunder and Salt Cess Act, 1953 and the Rules made thereunder will be applicable.

11. The manunfacturer will give intimation to the Salt Commissioner and Deputy Salt Commissioner| Asstt. Salt Commissioner|Superintendent of Salt concerned as soon as the plant is set up for inspection of the plant and the laboratory by the Salt Commissioner or any other officer on his behalf. Actual production of iodised salt should not commence unless the plant and the laboratory are inspected and approved by the Salt Commissioner or the authorised officer. After the plant and the laboratory are so inspected and approved, the plant will be registered with the Salt Commissioner for the production of iodised salt.

12. The iodisation plant so established shall be open for inspection by the Salt Commissioner or any other officer authorised by him at any time and the manufacturer will rigidly carry out the instructions issued by the Inspecting Officer in regard to the proper maintenance of the prescribed records, general cleanliness, proper operation of the plant to its full capacity and the quality of raw salt, finished products etc.

ANNEXURE—XIV

Government of.............
Health & Family Welfare Department
Dated

NOTIFICATION

No.

In exercise of the powers conferred by Clause (iv) of Section 7 of the Prevention of Food Adulteration Act, 1954 (37 of 1954), I,................. the Food (Health) Authority of..................... hereby prohibit, in the interest of public health, the sale of salt, other than Iodised Salt, as an article of food within the districts of ....of this State.

"Iodised Salt" for the purpose of this order means common salt mixed with potassium iodate|calcium iodate in fixed proportion for edible purposes.

Sd|-

(   )
State Food (Health) Authority
Director of Medical and
Health Services....

ANNEXURE—XV

STANDARDS PRESCRIBED FOR EDIBLE COMMON SALT & IODISED SALT UNDER PREVENTION OF FOOD ADULTERATION RULES, 1955

EDIBLE COMMON SALT means a crystalline solid, white, pale pink, or light grey in colour free from visible contamination with clay, grit and other extraneous adulterant and impurities. It shall not contain moisture in excess of six per cent of the weight of the undried sample. The sodium chloride content (as NaCl) and the matter soluble in water other than sodium chloride on dry weight basis shall be as specified in columns (2) and (3) of the Table below against the period of validity mentioned in the corresponding entry in column (1) of the said Table. The matter insoluble in water shall not exceed 1.0 per cent by weight on dry weight basis.

TABLE

Period of Validity	Minimum percentage of sodium chloride content as NaCl (on dry basis)	Maximum percentage of matter soluble in water other than sodium chloride (on dry basis)
1	2	3
Upto 31-3-82 . . .	94.0	5.0
from 1-4-82 to 31-3-83 .	94.5	4.5
from 1-4-83 to 31-3-84 . .	95.0	4.0
from 1-4-84 to 31-3-85 . .	95.5	3.5
from 1-4-85 onwards . . .	96.0	3.0

Provided that table salt may contain aluminium silicate as an anticaking agent to a maximum extent of 2.0 per cent:

Provided further that the total matter insoluble in water in such cases shall not exceed 2.2 per cent and the sodium chloride content or dry basis shall not be less than 97.0 per cent by weight."

IODISED SALT means a crystalline solid, white or pale pink or light grey in colour free from visible contamination with clay, grit and other extraneous adulterants and impurities. It shall not contain moisture in excess of 6.0 per cent of the weight of the undried sample. It shall contain on dry weight basis (a) atleast 96.0 per cent by weight of sodium chloride (NaCl), (b) not more than 1.0 per cent by weight of matter insoluble in water, (c) not more than 3.0 per cent by weight of matter soluble in water other than sodium chloride and (d) the potassium iodate content shall be in the range of 25-35 ppm at manufacturers level and shall not be less than 15 ppm in distribution channel, including retail level.

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ANNEXURE—XVI

List of Iodisation Plant Fabridators

(Spray-mixing type plants)

1. M/s. Dynacraft Machine Company Ltd.,
   C.D. Barfiwala Marg,
   Andheri (West),
   Bombay-400 058.
2. M/s. Associated Indian Mechanical (Pvt.) Ltd.,
   Peerless Bhawan,
   3 Esplanade East (Top Floor),
   Calcutta-700 069.
3. M/s. Machine Build Industries,
   47, Vijaya Raghavachari Road,
   Thyagarajanagar,
   Madras-600 017.
4. M/s. Gansons (Pvt.) Ltd.,
   207, Kakad Chambers,
   Dr. Annie Besant Road,
   Bombay-400 018.
5. M/s. Doris (India) Engineers Ltd.,
   389, Arcot Road,
   Kodambakkam,
   Madras-600 024.
6. M/s. Spectom Engineering (Pvt.) Ltd.,
   Purushottam Estate,
   Bahucharaji Road,
   Baroda-390 018.
7. Engineering Services Corporation,
   Flat A, 916 Poonamalle High Road,
   Madras-600 084.
8. M/s. Advance Dynamics (Pvt.) Ltd.,
   F-36, Kirtinagar,
   New Delhi-110015.

ANNEXURE—XVII

List of Supplier of Potassium Iodate

1. M/s.
Anna L ories
15-16 M.K. Brothe
Jari Mari, Kurla—Andheri
Bombay 400 072.

ri and C y,
Barod

Princes
Bombay—

4. M/s. Dadha Tamil Nadu Drugs Ltd.,
56, Lloyds Road,
Madras—600 860.

M/s. H.T. Bhavnani Chemicals Pvt. Ltd.,
703-Dalamal House,
Point,
021.

ANNEXURE—XVIII

Breakup of Operational Cost for Iodisation of Salt at the Iodisation Plants at Howrah, Sambhar Lake and Kharaghoda during 1983-84

Head of Account	Howrah	Sambhar Lake	Kharaghoda
	Rs.	Rs.	Rs.
Pay & Allowances	1,13,765	1,30,532	1,09,430
Encashment of leave	...	15,465	1,173
Management	...	...	21,086
Admn. & Inspection charges	...	...	1,016
Bonus	...	40,370	24,472
Death-cum-Retirement gratuity	...	...	14,694
T.A.	...	5,834	580
Stores (A) Spare parts	10,431	...	19,225
(B) Fuel consumption	...	...	140
Electricity charges	16,038	29,231	24,068
Medical Expenses	...	1,102	595
D.L.I. Scheme	...	...	1,595
Wages of Labour	1,63,527	3,47,398	2,20,486
G.L.W.	...	...	169
L.T.C.	...	...	4,131
O.T.A.	...	437	111
I.R.	...	...	599
Equipment & material	28,424	64,483	...
Contingencies	3,477	...	...
Miscellaneous	1,461	...	...
Labour on Muster Rolls	...	85,620	...
Adhoc payment	...	4,197	...
Contribution to E.P.F.	...	42,658	...
CEA/Tuition Fee	...	418	...
Liveries	...	2,169	...
Stores & Gl. Workshop	...	28,175	...
Total	3,37,123	7,98,089	4,43,570
Less expenditure on salt iodised for Nepal	...	1,03,600	...
Total expenditure for indigenous areas	3,37,123	6,94,489	4,43,570
Total production of iodised salt for indigenous areas (in tonnes)	27,905	53,410	61,500
Operational cost during 1983-84 per tonne.	Rs. 12.05	Rs. 13.00	Rs. 7.20
Operational cost per tonne during 1982-83	Rs. 10.50	Rs. 7.25	Rs. 5.60
Operational cost per tonne during 1981-82	Rs. 12.30	Rs. 7.72	Rs. 7.30

(Source: Salt Commissioner & Hindustan Salts Limited, Jaipur).

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ANNEXURE—XIX

ct of anticipated Capital Outlay during the 7th Five Year Plan for Iodising the entire edible salt by 1990

(Figures in R

	Outlay on Plant & Machinery				Cost of Iodine chemical to be subsidised 100%	Op tio cos su to II, sal fac @ pe
	Cost of plants to be put up by Salt Commissioner.	Loans to Cat. I salt manufacturers	Subsidy to Category II, III & IV salt manufacturers	Total of columns 2, 3, & 4		
	2	3	4	5	6	
. . . .	10	80	110	200	160	
. . . .	15	360	525	900	320	1
. . . .	...	360	540	900	480	2
. . . .	...	20	30	50	640	2
. . . .	...	10	15	25	800	3
. . . .	25	830	1220	2075	2400	10

APPENDIX I

Process Detail

SPRAY MIXING PROCESS FOR IODIZATION OF SALT

Salt in crystalline form, is unloaded by the railway wagons|trucks and is stored at salt godowns. In case, salt is in the form of lumps, these are crushed in a hammer mill. The crushed salt is filled in cane baskets, each having salt carrying capacity of about 6 Kg. and then dumped over the feed hopper. The whole operation is manual.

A stainless steel wire mesh screen (3′×3′ 6″) made out of 3|8″ s.s. rods is fitted on the top of the feed hopper to prevent the gunny bags and baskets falling inside during the dumping operation. Large lumps of salt are also not allowed by the wire mesh before being crushed by hammering. The rotating shaft is provided with arms for taking the salt in the hopper in order not to allow the bridging. Another shaft with four 3|8″ thick s.s. strips acts as a rotary valve and is driven by a speed variator. This prevents the choking of the product specially when the fine powdery substance is fed. Both these shafts are driven by variable speed drive to give 20 to 60 rpm. speed. At the discharge end of the hopper, flexible rubber curtains are provided on three sides to prevent spilling of salt outside the rubber conveyor.

The salt is then fed to the inclined rubber belt conveyor and discharged at a height of about 8 ft. from ground level at the rate of 5 tons per hour at a belt speed of about 100 ft., per minute.

A 3 per cent potassium iodate solution is sprayed at an air pressure of 20 p.s.i. through special type of stainless steel nozzles on the belt discharged salt. Thereby the iodate-sprayed-salt falls in the spray chamber belted at the bottom end of screw mixer| conveyor.

The mixer, having stainless steel fabricated 9″ screw, discharges the iodised salt to the two bagging stations. The bagging outlets are provided with quick fixing clamps to take gunny bags. These (iodised salt) filled bags are carried on the hand trolley in storage space from where these are loaded in the railway wagons|trucks for despatch to goitre endemic areas or retail outlets.

Specifications of Plant and Equipment

1. FEED HOPPER

- — to be manufactured out of 8 guage stainless steel sheet, suitably reinforced on sides and top;
- — all parts coming in contact with the salt to be made of stainless steel, others of mild steel;
- — the hopper to be approximately 15″ to 18″ deep;
- — on the top of the hopper a heavy wire (3|8″ thick) mesh screen to be provided for preventing the gunny bags, baskets and large lumps of salt falling into the hopper during the dumping of the salt;
- — the outlet of hopper to be mounted with a 5″ dia rotary value to suit the 16″ wide belt conveyor;
- — hopper should be located as far back as possible on the inclined belt conveyor;
- — to be provided with flexible rubber curtain (shirting .10 mm. thick) on three sides of the inclined belt conveyor at the discharge end of the hopper;
- — the rotary valve to be fitted with a 21 teeth 1|2″ pitch m.s. chain sprocket operated by a variable drive;
- — feed hopper to be further equipped with a rotating shaft with arms for raking the salt in the hopper to prevent bridging;
- — the raker shaft also to be fitted with a 21 teeth 1|2″ pitch m.s. chain sprocket operated by the same variable drive;
- — to be provided with a driving arrangement consisting of—

1.1 One TEFC motor 1.5 HP., 1440 RPM, 415V, 3 phase; directly coupled with oil immersed worm reduction gear box (ratio 1 : 20) fitted with 10 teeth 2″ pitch m.s. chain sprocket driving the PIV gear box through 1|2″ pitch transmission roller chain;

1.2 a positive infinitely variable (1 : 4 ratio) gear box fitted with 10 teeth 1|2″ pitch m.s. chain sprocket;

1.3 a duplex chain sprocket mounted on output shaft of the PIV reduction gear; chain sprocket to be made out of mild steel, to be of duplex type and to have 19 teeth 1|2″ pitch;

1.4 heavy duty transmission roller chain to drive two 21 teeth chain sprockets fitted on raker shaft and rotary valve shaft from the duplex chain sprocket fitted on the reduction gear box;

1.5 a suitable starter for 1.5 HP motor ; and

1.6 an angle iron stand for mounting suitably the mtor, reduction gear box and p.i.v. drive ;

1.7 suitable covers or guards easily removable for servicing to be provided by mounting over the drive stand to protect the driving mechanism and motors against falling salt ;

1.8 *Recommended spares*
for an operation period of 2 years by normal use.

1.8.1 1 Variable speed drive chain of PIV gear ;

1.8.2 20 ft. long power transmission roller chain 1'2″ pitch with 2 locks ;

1.8.3 1 Electric motor 1.5 HP. 1440 rpm, 3 phase, 50 c's. with 1 : 20 ratio reduction gear box (ref. item 1.1) ;

2. INCLINED BELT CONVEYOR

— 18′ 6-1'2″ (centre to centre) long 16″ wide inclined troughed belt conveyor with discharge height of 8 ft. from ground level to be arranged at a slope of 21°-30″ (approx.).

— salt carrying capacity 5 tons per hour at a belt speed of about 100 feet per minute ;

— all steel work to be painted with three coats of best quality galvanite or aluminium smirit paint over good primer surface. ;

— to comprise of a frame, head and tail units, idlers, belt conveyor, accessories etc. as to the specifications given below ;

2.1 *Frame*

— Electrically welded-cum-bolted steel channel section with m.s. angle bracing ;

— sizes of stringer frames to be as follows :

Head end frame	4″-8″
Tail end frame	4″-8″
Intermediate frame	8″-0″

— height of the vertical supports to be as shown in the drawing.

2.2 *Deeking*

— sheet steel and bolted on the side stringers.

2.3 *Pulleys*

— made out of mild steel, fully machined and crowned for proper centering of the belt, of welded construction mounted on right through steel shaft with self-aligned ball bearings and pedestals ;

— sizes of pulleys to be as follows :—

Head pulley—12″ dia x 20″ face, 1½ ″shaft dia.
Tail pulley—12″ dia x 20″ face, 1½″ shafi dia.
snub pulley—5 ″ dia x 20″ face, ¾″ shaft dia.

— the shaft of head pulley to be fitted with a 38 teeth 1″ pitch m.s. chain sprocket to get drive from the geared motor having 19 teeth 1″ pitch sprocket by the heavy duty transmission roller chain of 1″ pitch.

2.4 *Idlers*

— sealed type 3—roll, two plane, 3″ dia suitably spaced on the top and bottom (return) ;

— extra impact idlers to be provided at the feeding points to prevent damage to the belt ;

— the sizes of idlers to be as follows :

T—troughing idlers 3″ diax6½″ face
R—return idlers 3″ diax20″ face
I—impact idlers 3″ diax 6½″ face.

2.5 *Conveyor belt*

— endless rubber conveyor belt 16 inch wide× 4″ ply 28 oz. duck grade 'A' ;

— endless belt length (to suit the above conveyor) 40 ft. 1-1|4″ (approx.) ;

— Dunlop or Goodyear belting to be used.

2.6 *Tension device*

— screw operated take-up device with bearing block to enable correct tension of the conveyor belt.

2.7 *Bearing*

— all shafts running in 1-1|2″ double row ball bearings, self-aligning plummer blocks.

2.8 *Drive unit*

— 1.5 HP 1440 rpm. 3 phase 50 cycles per second electric under directly coupled with oil immersed worm reduction gear box (ratio 1 : 20) driving the head drum (pulley) through chain drive ;

— output shaft of the above geared motor to be fitted with a 19 teeth 1 inch pitch m.s. chain sprocket to give drive to the 38 teeth 1 inch pitch chain sprocket fitted on head pulley through a heavy duty transmission roller chain (1 inch pitch) ;

— a suitable starter for 1.5 HP motor ;

— geared motor and starter to be bolted to m.s. supporting structure as shown in the drawing.

2.9 *Guards*

— short metal guards to be fitted to the exposed drive viz. chain sprockets and transmission chain ;

— these protective guards to be removable type to allow servicing.

2.10 *Belt cleaners*

— Cleaners of balance type to be provided at the discharge end of the conveyor.

2.11 *Supports*

- — supports to the conveyor to be fabricated out of m.s. angles and channels and to be of welded construction type.

2.12 *Recommended spares.*
for an operation period of 2 years by normal use.

2.12.1 1 Endless belt (Ref. item 2.5).

2.12.2 10 ft. long power transmission roller chain 1 inch pitch with 2 locks.

2.12.3 2 self-aligning type double row ball bearing for 1-1|2″ shafts of feed hopper and belt conveyor.

3. SCREW MIXER|CONVEYOR

3.1 *Screw mixer to have following dimensions*:

Length of trough	9 ft.
Diameter of trough	9 ½ in (I.D.)
Height of trough	12 in
Diameter of Screw	9 in.
Pitch of screw	9 in
Clearance between the screw & trough	1/8 in (maximum)
Shaft diameter	2 in.

- — to be fabricated out of 8 gauge stainless steel sheets and rods and to be duly finished with all welds and well ground ;
- — top cover removable type ;
- — shaft to be provided with 2″ standard double row self aligning type ball bearings with pedestals at the ends ;
- — bearing pedestals to be suitably bolted to the m.s. frame of the screw conveyor ;
- — to be provided with a 2″ thrust bearing on the drive end side of the shaft ;
- — screw conveyor to be adequtately supported so as to have vibration free running while on load ;
- — to be provided with 2 nos. bag filling stations (fabricated out of stainless steel sheeting) with suitable flap gates located at the bottom of the trough of screw conveyor ;
- — bagging outlets to be provided with quick fixing clamps to take gunny bags.

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3.2 Drive to be arranged through on oil immersed worm reduction gear (ratio 1 : 10) to give a speed of about 140 RPM to the screw shaft ; drive motor to be of 1 HP and 1440 RPM to work on 415 V, 3 phase, 50 c|s. A.C. supply ;

- — motor directly coupled to reduction gear ;
- — geared motor to be directly bolted to the
- — m.s. frame as shown in drawing ;
- — power transmission from the reduction gear to the screw mixer to be directly given through a suitable coupling arrangement ;
- — a guard to be provided for the coupling.

3.3 A suitable starter for 1 H.P. motor be fitted on drive frame ;

- — a protective cover to be provided for reduction gear motor.

3.4 *Recommended spares.*
for an operation period of 2 years normal use.

3.4.1 2 Double row ball bearing (2″) for screw shaft.

3.4.2 1 Thrust bearing for screw shaft.

3.4.2 2 Quick releasing device for bag.

4. SPRAY CHAMBER.

- — to be fabricated out of 14 gauge stainless steel sheeting (ASSAB 913 cold rolled 2D finish) with suitable stiffener and adjustable support for the spray nozzle ;
- — size of the spray chamber to be 18″×36″×18″ high with a hinged opening for survelliance ;
- — spray chamber to be bolted at the bottom end of the screw ;
- — all material, viz. bolts, nuts, washers, support etc. to be of stainless steel.

5. STRUCTURE FOR SUPPORTING IODATE SOLUTION DRUMS AND PLATFORM FOR SPRAY CHAMBER

- — support to be 4 ft. high made out of 2 in. galvanized piping with screwed ends suitable for taking standard flanges for fixing to the floor ;
- — supports to have tie bars and cross members to provide a rigid and stable platform ;
- — top of the platform 4 ft. 3 in. × 3 ft. 6 in. to have steel chequered plates suitably supported and fixed to the frame work ;
- — the platform to have an access ladder of tubular structure with a hand railing on both sides ;
- — the ladder to be bolted to the supporting structure ;
- — the paltform to have hand railing on its three open ends;
- — all steel work to be painted with three coats of best quality galvanite or aluminimum smirit paint over good primer surface.

6. STAINLESS STEEL DRUMS

- — to be made as per ASTM specifications A 262 44T.
- — top height 22 in. and closer diameter 17 in. 25—40 psi, size 1|4 in.
- — drop tested, hydrostatic tested, corrossion tested and pressure tested to 80 p.s.i.

6.1 To be provided with a safety pop valve 1|4″ (No. 47722L).

6.2 *Recommended spares*
for an operation period of 2 years normal use.

6.2.1 6 Safety pop valves 1|4″ (ref. item 6.1).

7. SPRAY NOZZLE

7.1 2 Stainless steel spray nozzles 1|4 LNSS 2.0 with 200 mesh strainers;

— capacity to spray 7 kg. solution per hour at 25 p.s.i., with spray angle of 50°

7.2 *Recommended spares*

for an operation period of 2 years normal use.

7.2.1 4 Spray nozzles (Ref. Item 7.1).

7.2.2 4 Strainers 200 mesh for spray nozzles.

8. AIR COMPRESSOR

Single cylinder air compressor and receiver.

— capacity 2.6 cft, 100 p.s.i.

— unit to be provided with a suitable base plate and foundation bolts.

8.1 — Air receiver of 5 gallons capacity;

— to be supplied with a pressure gauge, safety valve non-return valve and a drain cock;

8.2 — Complete with TEFC squirrel cage induction motor ½ HP alongwith a starter with overall protection;

— motor to be mounted on a welded horizontal air receiver alongwith compressor;

— units to be provided with a pressure switch to shut off and start the motor at predetermined pressure;

8.3 *Recommended spares*

for an operation period of 2 years normal use.

8.3.1 2 V-belts.

8.3.2 2 complete sets of gaskets.

8.3.3 1 set Oil retainer ring.

8.3.4 1 set Compressor ring.

8.3.5 1 set Connecting rod bush and shells.

8.3.6 1 set Delivery valve plate and spring.

8.3.7 1 set Suction valve plate and spring.

8.3.8 1 Pressure switch.

8.3.9 2 Diaphragm and copper contacts.

8.3.10 1 set Breather valve and plate.

8.3.11 1 set spanners and tools (specially used for compressor)

9. AIR TRANSFORMER (Pressure Reducing valve)

25 p.s.i. transformer, 3|8″ size complete with pressure reducing valve, pressure gauge, shut off valve, air filter, capable of reducing air pressure from 100 p.s.i. to 10 p.s.i.

9.1 *Recommended spares*

for an operation period of 2 years normal use.

9.1.1 1 Pressure reducing valve 3|8″

9.1.2 1 Shut off valve 3|8″

9.1.3 20 ft. PVC tubing.

10. HAND TROLLEY

Trolley with C.I. wheels capable of carrying 250 kg. load hand driven type with a set of spare wheels.

11. VIBRATORY FEEDER

Equivalent of Syntron style D86714, 2.5 Amp, 230 Volts, 50 c|s F-152 Feeder base assembly 12″ W × 24″ long C-72723 trough stainless steel, base mounting B-82861 complete with FC-152 controller assembly C-60019-B 230|50.

Possible supplier

Syntron New York Sales Co. Inc., 1860 Broadway, New York.

12. WEIGH SCALE

Capacity 200 kg., scale graduation 2 kg., reading 1 kg., dial type, scale head with spring weighing mechanism precision potentiometer and mechanical zero and overflow contacts, portable type scale.

13. SPECIFICATION FOR 18|8 STAINLESS STEEL MATERIAL

— stainless steel sheets to be as per ASSAB 913 cold rolled 2D finish or hot rolled finish as per data|requirement;

— stainless steel angles to be as per ASSAB 911 hot rolled;

— stainless steel bars to be as per ASSAB 911 hot-rolled, annealed and descaled;

— stainless steel pipes to be as per ASSAB annealed and descaled;

— stainless steel bolts, nuts and washers as per grade ASSAB 913;

— stainless steel split pins as of grade ASSAB 925.

APPENDIX 2

SUBMERSION METHOD OF IODISATION OF SALT

PROCESS DETAIL

Introduction

The process of Iodisation takes place in three different inter connected tanks (Ref. Drg.). It is advisable to use the construction materials like sand, cement, bricks, stones, etc. which are locally available in the particular area. However, if expenditure permits it is suggested to construct R.C.C. tanks with smooth and polished cement plaster by using water proof cement.

Foundation—Foundation concrete 1 : 4 : 8.

Wall foundations are to be carried out in cement concrete 1 : 4 : 8 (one part of cement : Four parts of river sand : eight parts of stone metal).

Generally the soil of site (being nearer to sea) is of alluvial nature (load bearing capacity 1|4 to 3|4 tons|S. ft.) and therefore, a layer of (150 mm thick) sand below the concrete is recommended so as to increase the bearing capacity of soil and to ensure safety against uneven settlement.

Masonry—Masonry in C.M. 1 : 4.

Brick masonry walls (230 mm thick) are constructed in cement mortar (prop. 1 : 4) with necessary off set as per site condition over the foundation concrete.

Flooring—I.P.S. Flooring :

In general flooring of all the tanks should be water tight. Floor base concecrete (in prop. 1 : 4 : 8 and 100 mm to 120 mm thick) should be laid after proper watering and compacting the sand or moorum. I.P.S. (Indian Patent Stone flooring) in cement concrete prop. 1 : 2 : 4 with round vata at the junction of vertical walls and the bottom floor should be provided with necessary slope as required.

Plastering—Cement plaster in C.M. 1 : 3

Plastering to all the walls is to be carried out in cement mortar (prop. 1 : 3) with cement finishing and by adding water proof cement as per requirement

NOTE

In this technical note foundation details are no specified as its design depends upon the situation and nature of soil.

[*Source* : C.S.M.C.R.I., Bhavnagar.]

APPENDIX 3

Method of analysis of Iodised salt containing Potassium or Calcium Iodate :

Determination of Iodine

(*A*) *Reagents*	*Specification*
1. Potassium iodate (KIO_3)	A.R. Grade
2. Potassium iodide (KI)	„
3. Sodium thiosulphate ($Na_2S_2O_3$)	„
4. Conc. Sulphuric Acid (H_2SO_4)	„
5. Starch	„

(B) ***Preparation of Standard Solutions*:**

1. Potassium iodate : 0.1N and 0.005N. Dissolve 3.567 g of KIO_3 (oven dried at 120°C for 1 hour) in distilled water and make up the volume to 1 litre. The solution will become 0.1N. Dilute further 0.1N KIO_3 by 20 times the solution will be 0.005N.
2. Sodium thiosulphate : 0.1N and 0.005N. Dissolve 25 g of $Na_2S_2O_3$ —$5H_2$ 0 in distilled water and make up the volume to 1 litre. The solution will become 0.1N. Dilute further 0.1N $Na_2S_2O_3$ solution by 20 times, the solution will be 0.005N.
3. *Potassium iodide* : 10%
   Dissolve 10 g of KI in distilled water and make the volume to 100 ml.
4. *Sulphuric Acid H_2SO_4 2N*
   Dilute concentrated H_2SO_4 (36N) by 18 times e.g. 56 ml H_2SO_4 dilute with distilled water to 1 litre.
5. *Starch indicator* — 1% :
   Take 1 gm of starch and prepare a slurry in 50 ml of cold water. Add this slurry slowly in 50 ml of hot distilled water.

(C) *Standardisation of Sodium thiosulphate solution* :

Take 0.1N $Na_2S_2O_3$ solution in a burette and 25 ml of 0.1N. standard KIO_3 in conical flask using standard pipette. Add 1 to 2 ml of 2N H_2SO_4 and 5 ml KI. Titrate the solution (liberated iodine) against Sodium thiosulphate, Use starch as an indicator near the end of titration. The colour change will be from blue to colourless.

Standardise 0.005N $Na_2S_2O_3$ using 0.005N KIO_3 in the same way.

$$\text{Normality of } Na_2S_2O_3 = \frac{N_1 \text{ X } V_1}{V_2} = N_2$$

Where N_1 = Normality of KIO_3
V_1 = Volume of KIO_3
N_2 = Normality of $Na_2S_2O_3$
V_2 = Volume of $Na_2S_2O_3$

(D) *Determination of iodine from iodised salt* :

Take 50 mg of iodised salt and dissolve it in about 200 ml of water. Add 1—2 ml of 2N. H_2SO_4 and 5 ml of 10% KI. Titrate aaginst 0.005 N $Na_2S_2O_3$ solution using starch indicator.

Calculation

$$\text{Iodine } (\pm) \text{ ppm} = \frac{R \times 20 \times 10^3 \times 0.127 \times N_2}{6}$$

Where R = reading of $Na_2S_2O_3$
N_2 = normality of $Na_2S_2O_3$

NOTE—In this calculation multiplication of 20 is to convert reading for 1000 g of salt and 10^3 is to convert "g" of iodine to "mg" of iodine. Regarding the description of the materials, moisture content, particle size, pH, matter insoluble in water and other specifications, it is necessary to refer "Indian Standards Specification for iodised salt"— IS 7224 : 1973.

Source : C.S.M.C.R.I., Bhavnagar.

APPENDIX-4

Solubility of Iodine and its Compounds

	Relative molecular mass.	Percentage Iodine	Solubility in water (g/l)				
			0°C	20°C	30°C	40°C	60°C
—Iodine, I_2	254	100	...	0.290	0.400	0.560	
—Calcium Iodide, $Ca I_2$	294	86.5	646	676	690	708	740
—Calcium Iodate, $Ca (IO_3)2 (6H_2O)$	390	65.0	1.00		4.20	6.10	13.6
—Potassium Iodide, KI	166	76.5	1280	1440	1520	1600	1760
—Potassium Iodate, KIO_3	214	59.5	47.3	81.3	117	128	185
—Sodium Iodide, $Na I (2 H_2O)$	150	85.0	1590	1790	1900	2050	2570
—Sodium Iodate, $Na IO_3$	198	64.0	25.0	90.0		150	210

(Source : *The Control of Endemic Goitre,* DeMaeyer, E.M., et al., Geneva (1979) World Health Organisation, p.20.)

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APPENDIX-5

Salt iodisation for different intakes of salt and iodine

Iodine intake per (micro gms)	Average salt intake per person per day	Ratio of Iodine to Salt (mg/Kg)	Ratio of KIO_3 to salt (mg/Kg)	KIO_3 in 5000kg* salt (g)	KIO_3 solution in litres/h for 5000 kg/h iodisation units		
					10 g/1 KIO_3 solution	20 g/1 KIO_3 solution	30 g/1 KIO_3 solutio
100	5 g	20	33.70	168.50	16.85	8.43	5.6
	10 g	10	16.85	84.25	8.43	4.22	2.8
	15 g	6.67	11.23	56.15	5.62	2.81	1.8
150	5 g	30.03	50.55	252.50	25.25	12.63	8.4
	10 g	16.13	25.28	126.40	12.64	6.32	4.2
	15 g	10.00	16.85	84.25	8.43	4.22	2.8
200	5 g	40.00	67.40	337.00	33.70	16.85	11.2
	10 g	20.00	33.70	168.50	16.85	8.43	5.6
	15 g	13.33	22.47	112.35	11.24	5.62	3.7
250	5 g	50.00	84.25	421.25	42.13	21.07	14.0
	10 g	25.00	42.13	210.65	21.07	10.54	7.0
	15 g	16.67	28.08	140.40	14.04	7.02	4.6
300	5 g	60.24	101.10	505.50	50.55	25.28	16.8
	10 g	30.03	50.55	252.75	25.28	12.64	8.4
	15 g	20.00	33.70	168.50	16.85	8.43	5.6
400	5 g	80.00	134.80	674.00	67.40	33.70	22.4
	10 g	40.00	67.40	337.00	33.70	16.85	11.2
	15 g	26.67	44.93	224.65	22.47	11.24	7.4

*1.685 mg of Potassium Iodate contains 1 mg of Iodine.

(Source: *The Control of Endemic Goitre.* De Maeyer, E.M., et al, Geneva (1979), WHO.

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